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ECEMBER 21, 1942
OLUME 31, No. 26

AMERICAN DYESTUFF REPORTER

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With that relentless taskmaster "Production" pressing, pressing, pressing, there were many occasions during 1942 when even the Patience of Job would have been tried.

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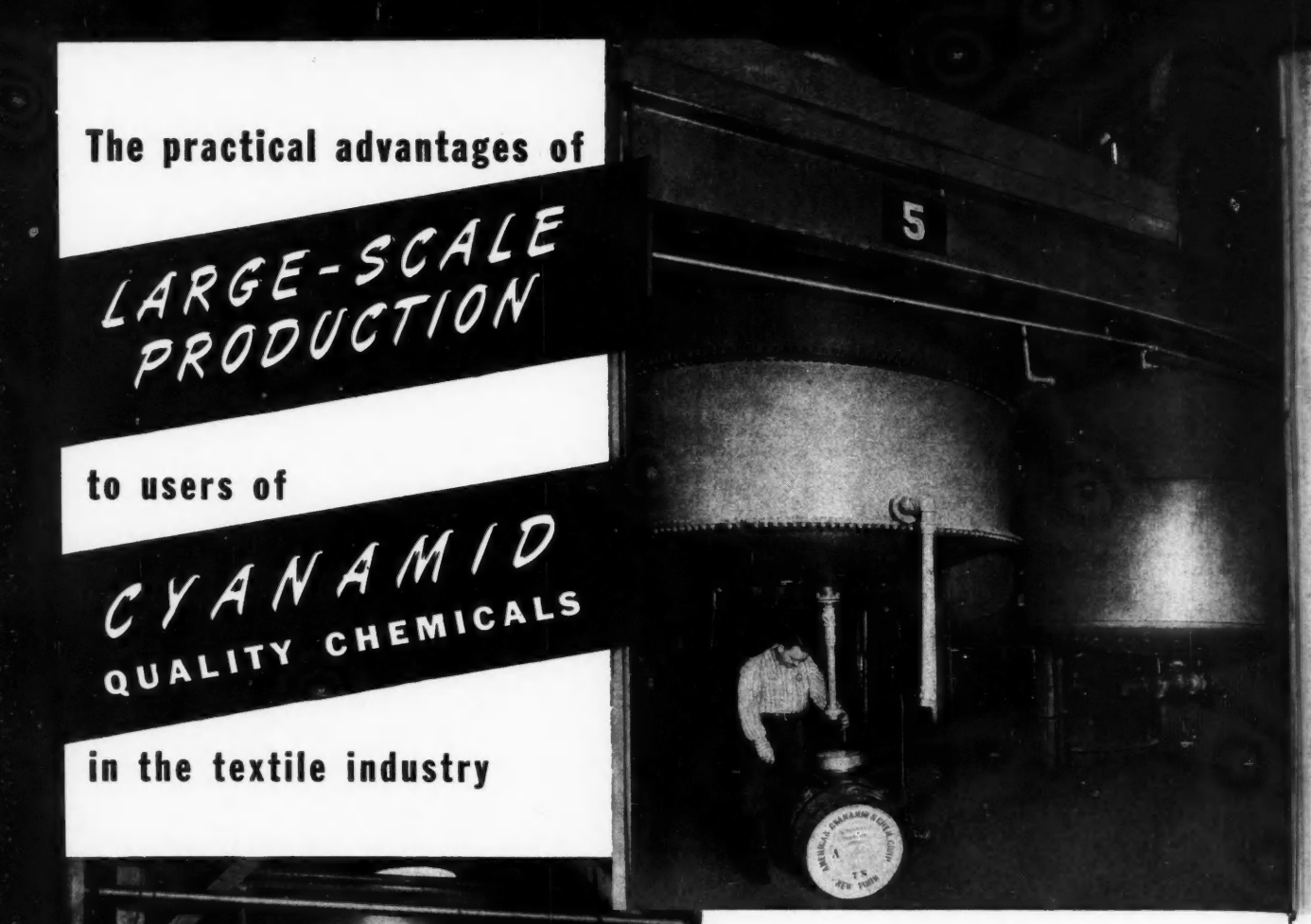
And it was just that kind of thoughtfulness that we, also, had a difficult job, which makes us eternally grateful not only for the business with which we were favored but for the peace of mind which you gave us in the process of serving you.

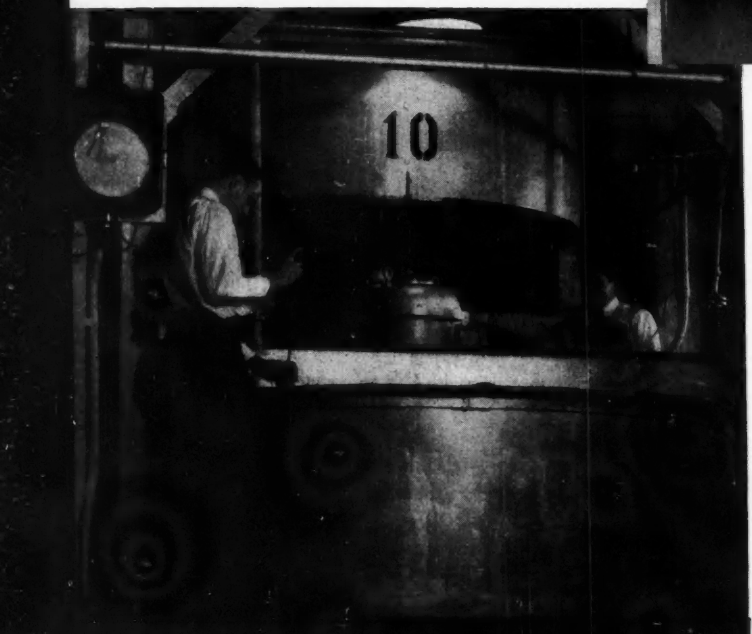
Our wish is for your good fortune in 1943.

Geigy Company Inc.

FFICIAL PUBLICATION
of the
PROCEEDINGS
ERICAN ASSOCIATION
TEXTILE CHEMISTS
AND COLORISTS

The practical advantages of LARGE-SCALE PRODUCTION to users of CYANAMID QUALITY CHEMICALS in the textile industry





(above) One of Cyanamid's modern large-capacity units for the production of textile chemicals. Large-scale production means greatest possible uniformity in chemical supply.

(left) A similar unit in another Cyanamid plant. Each step in Cyanamid's volume production methods is planned and carried out to deliver highest quality as well.

REGARDLESS of whether the volume required is moderate or in carload lots, chemicals for the textile manufacturing processes should be of a consistently reliable, uniform quality at all times.

The source of supply of textile chemicals . . . the sulphonated oils, penetrants, sizing compounds, wetting agents and other specialties . . . therefore becomes a primary consideration to the manufacturer in establishing economically dependable processing results.

Cyanamid recognizes this vital part played by chemicals throughout the textile industry. Cyanamid is also aware that the supplies required by the textile industry can best be provided by high-standard volume production, insuring the barrel by barrel uniformity made possible by large batch manufacture. As a result, Cyanamid has set up modern large-scale facilities adjacent to the important centers of textile manufacture.

Cyanamid today is able to assure textile manufacturers that their requirements, both large and small, will be accurately and quickly filled with chemicals of a consistently high quality.

Cyanamid is also prepared to serve textile manufacturers on problems relating to the proper selection of chemicals to meet changing specifications in production . . . a valuable extra service without charge or obligation that is backed by extensive research and practical field experience.

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Greetings
OF THE SEASON

One of the real joys of this Yuletide is the opportunity to put aside the heavy routine of tense everyday business, and in real sincerity, wish our many friends and customers who have borne with us patiently, cooperatively and with generous understanding, a Merry Christmas and a New Year filled with the promise of better things to come.

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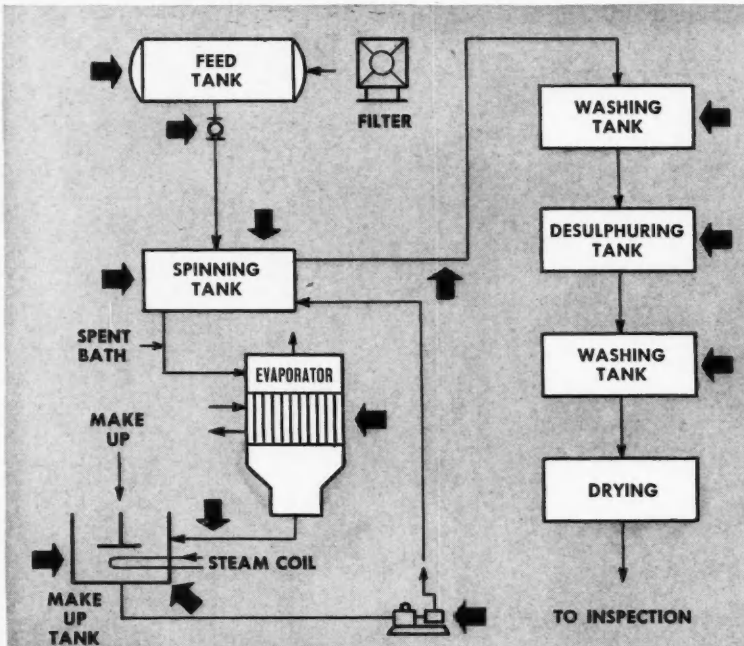

Arrows indicate where Carbon, Graphite and "Karbate" Equipment is successfully applied in the Viscose Rayon Process. Some of the applications include:

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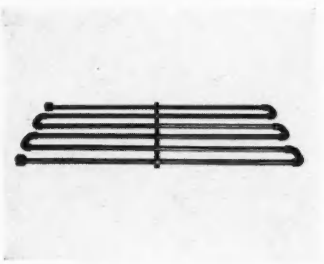
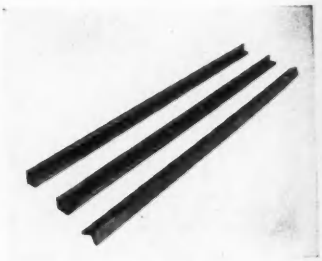
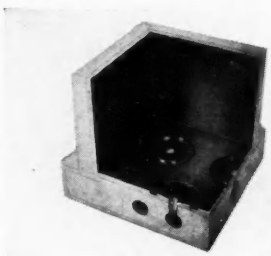
Write for a copy of Catalog Section M-8800A describing properties and use of these materials.



Heating Coil ↑ *Section of Washing Tank* ↓



Acid Tray Support Rails ↑ *De-Aerated Water Manifold Line* ↓



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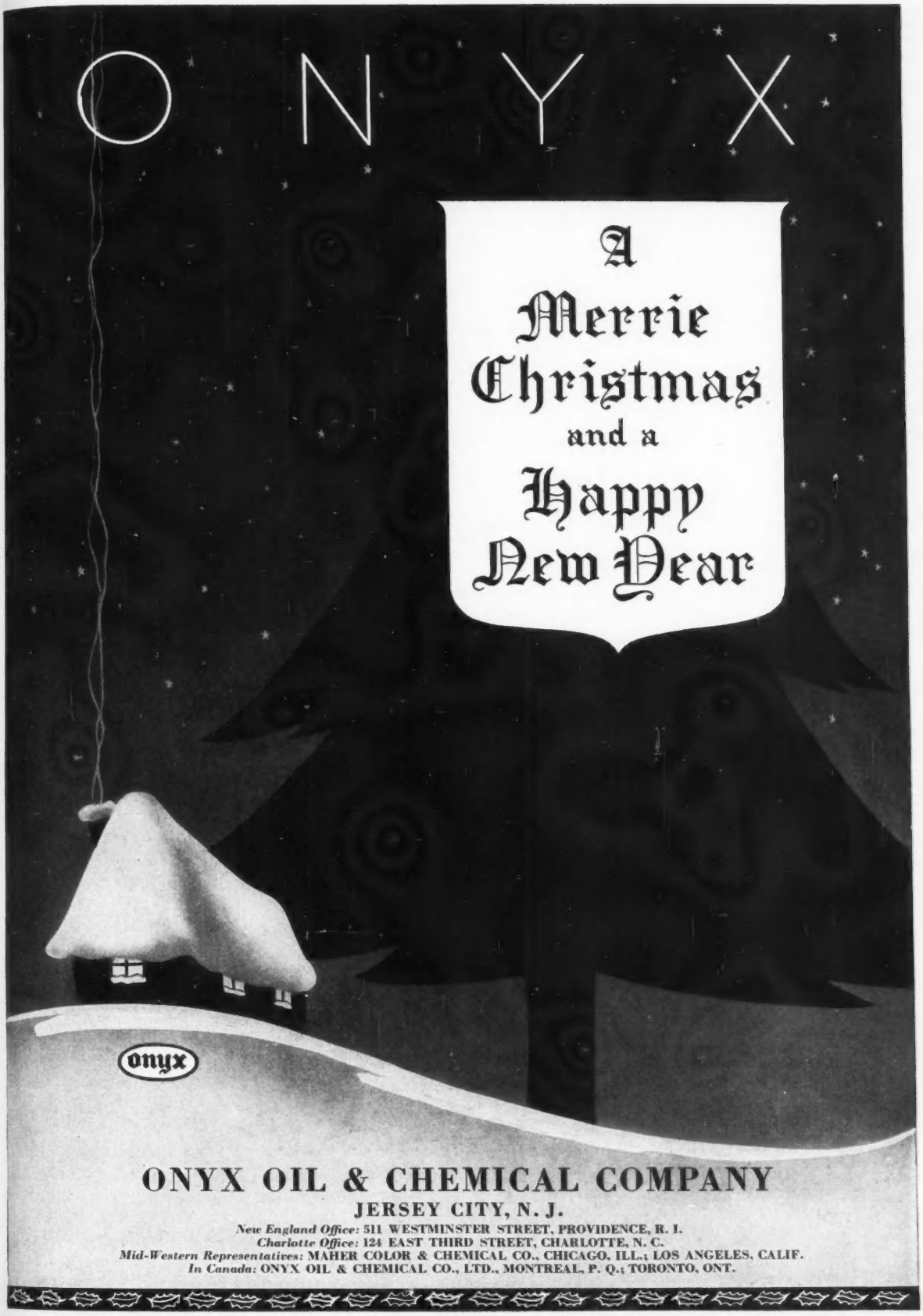

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This advertisement is of special interest to Converters, Manufacturers and Retailers

WHAT'S IN THIS NEW "CROWN" TESTED PLAN FOR YOU?

REG. U. S. PAT. OFF.

No. 1 of a series — from our confidential files on the "CROWN" Tested Plan

Here is a case history that clearly demonstrates the way the new CROWN Tested Plan is operating.

Naturally we cannot violate a confidence by revealing the name of this particular converter. But we have his full permission to give you the facts.

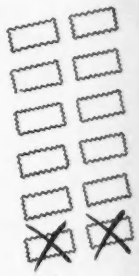
This converter submitted what he considered his best cloth—a color range of fourteen shades—to be tested under the new CROWN Tested requirements.

As promised, we delivered 48-hour service in making the preliminary tests. Of the 14 colors tested, not one could meet the new CROWN Tested requirements.

Two colors failed on perspiration resistance; twelve could not stand up to atmospheric fading requirements. We might have stopped then and there, but that's not the way CROWN Tested works, today.

Our job, then, was just beginning. The next step was to arrange, through our converter, a 3-way conference with the finisher. We discussed in full the finishing routing.

Out of that discussion came a slight change in the dye formula which brought the two colors up well above the perspiration-resistance requirements. This change did not alter the style-value of the cloth one whit. It didn't even add a penny to the cost of the goods.



For ten of the twelve colors that had fallen down on atmospheric fading, an inhibitor was suggested. Of course, this new step added about a cent a yard to the cost of the cloth. But for that cent the converter got a cloth which should eliminate many a headache for his customers—all the way down the line to the ultimate consumer.

The last two colors the converter retired permanently from his line. Our tests had convinced him that nothing could make them truly fast.

Today, as a result of this 3-way collaboration, both the converter and his finisher are CROWN Tested licensees. Now, they both know the true meaning of the CROWN Tested Tag and the converter is convinced of its value to him.

Can we help *you?* We'll be glad to test your samples. Glad to give you the utmost in laboratory facilities. And if the problem requires it, we'll put our experimental plant at Marcus Hook—the Textile Unit—to work for *you!*

NEW INFORMATIVE LABELING!

Consumer Satisfaction by the "Three Tag" System

Three Tags . . . green for "washable," amber for "hand washable," and red for "dry clean only" . . . quickly flash the message on care of fabrics.

In addition each tag tells *how* to wash or dry clean, gives the yarn content of the fabric, the converter's name for the fabric, and tells for what use the fabric was approved.

Every tag also carries a clear statement of what "fabric stability" means by CROWN Tested definition: "Tests predict this fabric will not change visibly in size (2%), color, or texture during a reasonable service life."

Thus CROWN Tested identification serves as a witness, constantly testifying to the fabric quality consumers demand.

"CROWN" TESTED RAYON FABRICS

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CROWN TESTED AND APPROVED RAYON FABRIC

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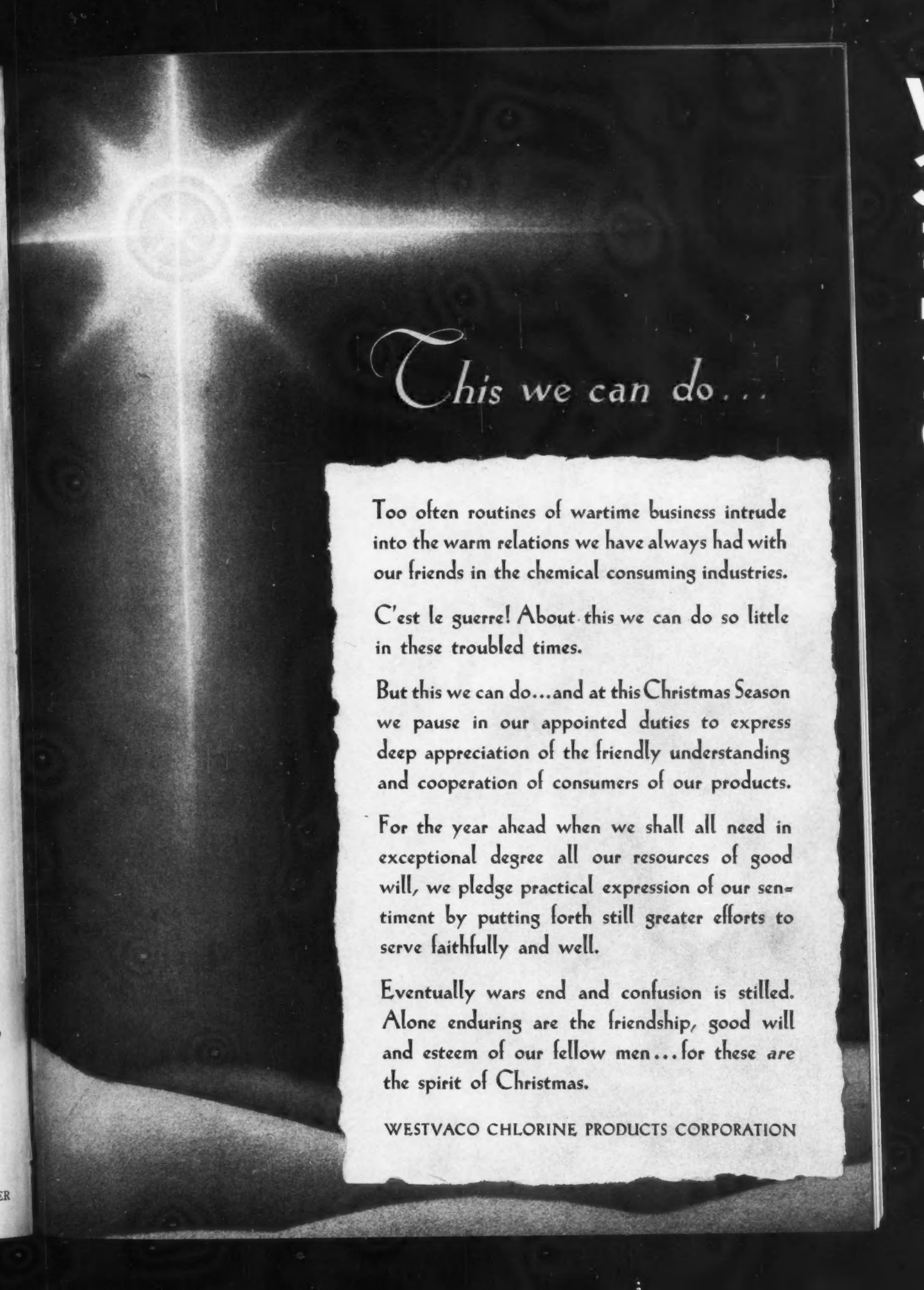
Producers of CROWN *Rayon Yarns and Staple Fibers*

Sales Offices: 350 Fifth Avenue, New York City; Providence, R. I.; Charlotte, N. C.; Philadelphia, Pa.


This we can do...
Too often routines of wartime business intrude into the warm relations we have always had with our friends in the chemical consuming industries.
C'est le guerre! About this we can do so little in these troubled times.
But this we can do...and at this Christmas Season we pause in our appointed duties to express deep appreciation of the friendly understanding and cooperation of consumers of our products.
For the year ahead when we shall all need in exceptional degree all our resources of good will, we pledge practical expression of our sentiment by putting forth still greater efforts to serve faithfully and well.
Eventually wars end and confusion is stilled. Alone enduring are the friendship, good will and esteem of our fellow men... for these *are* the spirit of Christmas.
WESTVACO CHLORINE PRODUCTS CORPORATION

The Alrose "Dog of the Year"

PRINCE

This winsome little fellow brings you our friendly greeting on the Alrose calendar for 1943. His predecessor, shown at right, proved so popular in 1942 that we were unable to supply calendars to all requesting them.

If you would like our 1943 calendar featuring a beautiful reproduction of the appealing dog portrait above, don't delay, for the supply is limited. Write immediately to avoid disappointment.

REMEMBER THE ALROSE DOG OF '42?

"Duke" has won a host of friends.

ALROSE CHEMICAL CO.

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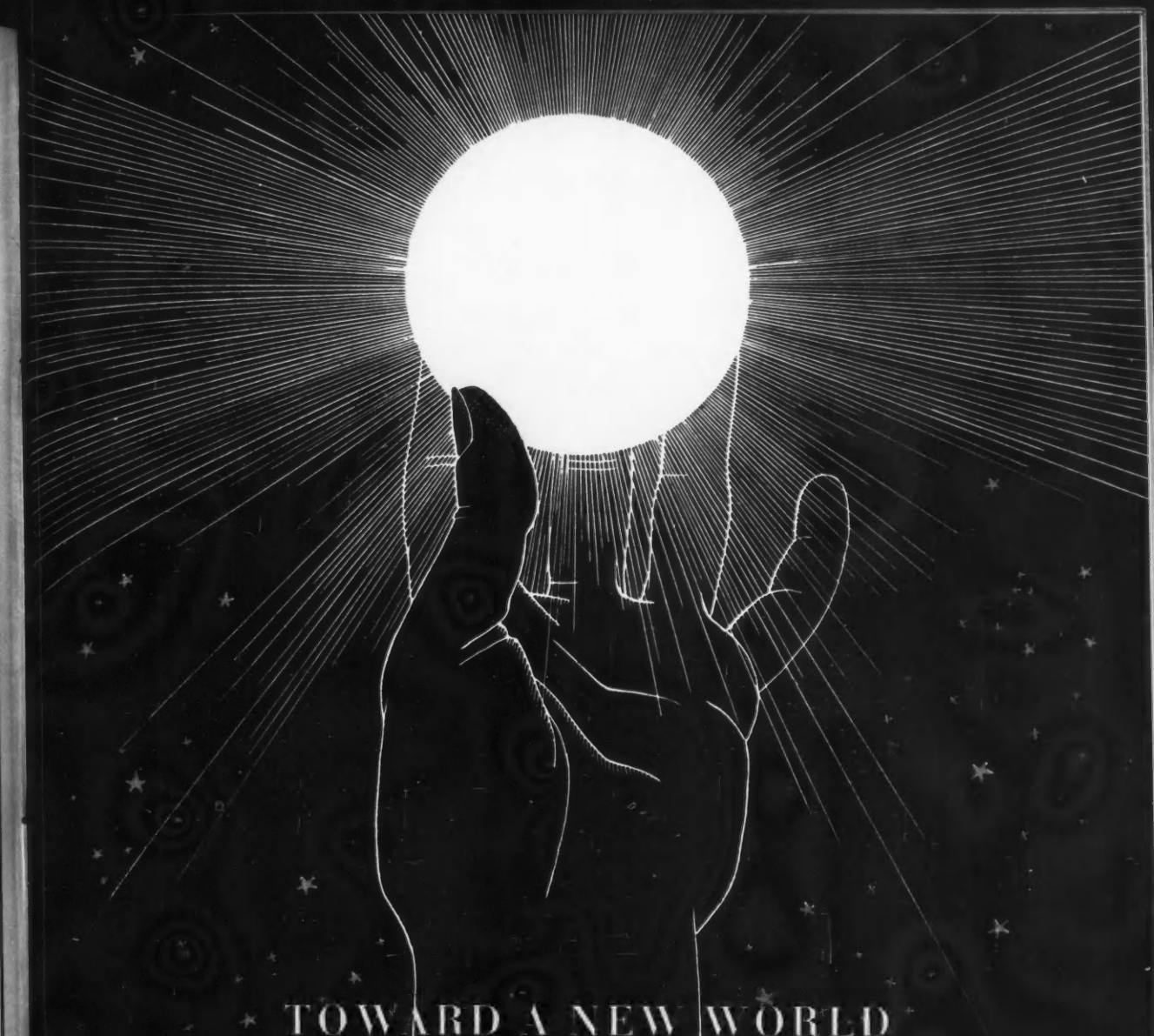
Devoted to Products of Research



TOWARD A NEW WORLD

Out of the frenzied ferment into which the whole world has been so violently tossed there will evolve a new sphere of action ☆ Out of this epic struggle America will emerge mightier than ever with its resources intact and potentialities expanded ☆ Machines of destruction will be converted into engines of creation. American industry will continue to use all hands and pour forth an abundance of products that will be needed by exhausted nations ☆ Out of our efforts to meet today's emergencies will come unique discoveries that will contribute vastly to the life of tomorrow. Every hour we are moving faster toward that *New World.*

GENERAL DYESTUFF CORPORATION • NEW YORK

The eyes of all America are upon the United States Treasury Roll of Honor appearing in the "Payroll Savings News." For copy write War Savings Staff, Treasury Department, Washington, D. C.

HOW TO "TOP THAT 10% BY NEW YEAR'S"

Out of the 13 labor-management conferences sponsored by the National Committee for Payroll Savings and conducted by the Treasury Department throughout the Nation has come this formula for reaching the 10% of gross payroll War Bond objective:

1. ***Decide to get 10%.***
   It has been the Treasury experience wherever management and labor have gotten together and decided the job could be done, the job was done.
2. ***Get a committee of labor and management to work out details for solicitation.***
   a. They, in turn, will appoint captain-leaders or chairmen who will be responsible for actual solicitation of no more than 10 workers.
   b. A card should be prepared for each and every worker with his name on it.
   c. An estimate should be made of the possible amount each worker can set aside so that an "over-all" of 10% is achieved. Some may not be able to set aside 10%, others can save more.
3. ***Set aside a date to start the drive.***
4. ***There should be little or no time between the announcement of the drive and the drive itself.***
   The drive should last not over 1 week.
5. The opening of the drive may be through a talk, a rally, or just a plain announcement in each department.
6. Schedule competition between departments; show progress charts daily.
7. Set as a goal the Treasury flag with a "T."

AS of today, more than 20,000 firms of all sizes have reached the "Honor Roll" goal of at least 10% of the gross payroll in War Bonds. This is a glorious testimony to the voluntary American way of facing emergencies.

But there is still more to be done. By January 1st, 1943, the Treasury hopes to raise participation from the present total of around 20,000,000 employees investing an average of 8% of earnings to over 30,000,000 investing an average of at least 10% of earnings in War Bonds.

You are urged to set your own sights accordingly and to do all in your power to start the new year on the Roll of Honor, to give War Bonds for bonuses, and to purchase up to the limit, both personally and as a company, of Series F and G Bonds. (Remember that the new limitation of purchases of F and G Bonds in any one calendar year has been increased from $50,000 to $100,000.)

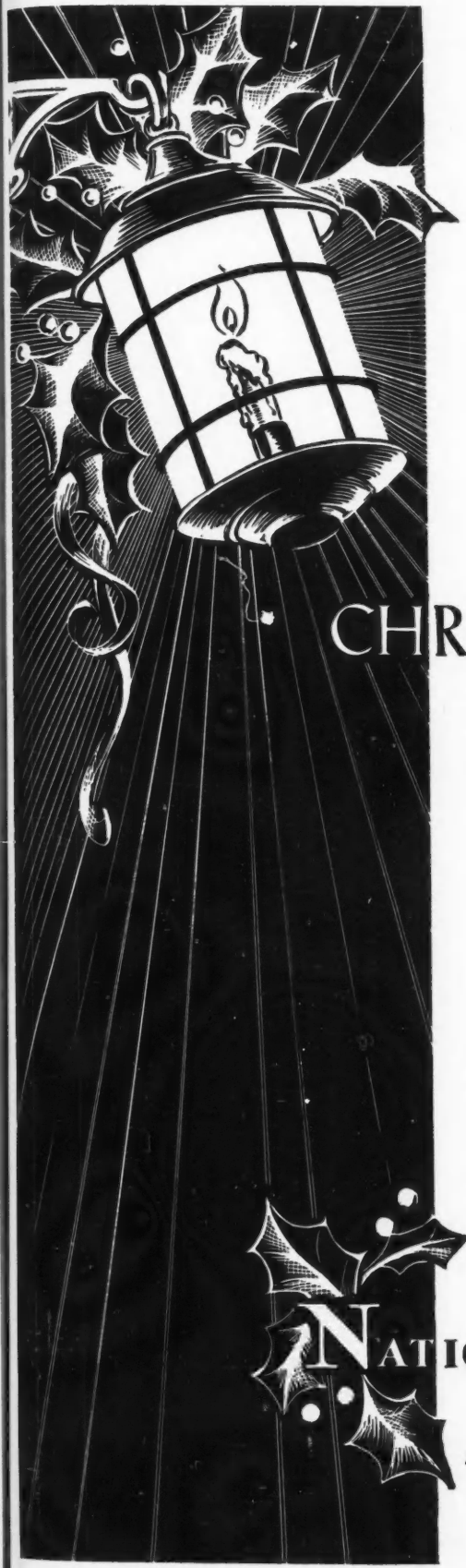
TIME IS SHORT. Our country is counting on you to—

"TOP THAT 10% BY NEW YEAR'S"

EVERYBODY EVERY PAYDAY AT LEAST 10%

Save with
War Savings Bonds

This space is a Contribution to America's All-Out War Effort by AMERICAN DYESTUFF REPORTER



To our friends in
the Textile Industry
we extend sincere
CHRISTMAS GREETINGS
and pledge our
unstinted efforts
in serving you
for the year ahead

NATIONAL ANILINE DIVISION

ALLIED CHEMICAL AND DYE CORPORATION

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For Navy Blues

Pharmasols

Blue GNXX
Blue GDNN

THESE azoic colors, for printing cotton, linen or rayon, produce Navy Blue of good fastness at a low cost. In combination with the Pharmasol Yellows they produce deep Browns.

PHARMASOLS are stabilized solutions, adjusted to the most practical concentration, which can be easily applied with a maximum of efficiency.

PHARMASOLS do not decompose and thereby they overcome the otherwise problems of troublesome dissolving.

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BLUE IBC

THE outstanding soluble vat color for producing bright Blues in any depth, of excellent fastness, is Indigosol Blue IBC. It is suitable for dyeing, padding and printing on cotton, linen or rayon (excepting acetate fibres) where maximum fastness is required.

Indigosol Blue IBC is an important member of the group of very fast Indigosols, all of which are readily soluble and easily developed.

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A. P. HOWES
Publisher

LOUIS A. OLNEY, D.Sc.
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Official Publication of the Proceedings of the American Association of Textile Chemists and Colorists

DECEMBER 21, 1942
VOLUME 31 NUMBER 26

American Dyestuff Reporter, Vol 31, No. 26, Dec. 21, 1942. Published every other Monday. Copyright, 1942, by Howes Publishing Co., 440 4th Ave., New York, N. Y. Domestic subscription, $5.00, Canadian, $6.00, Foreign, $6.00. Entered as second-class matter, Nov. 6, 1919, at the New York, N. Y., Post Office, under the act of March 3, 1879.

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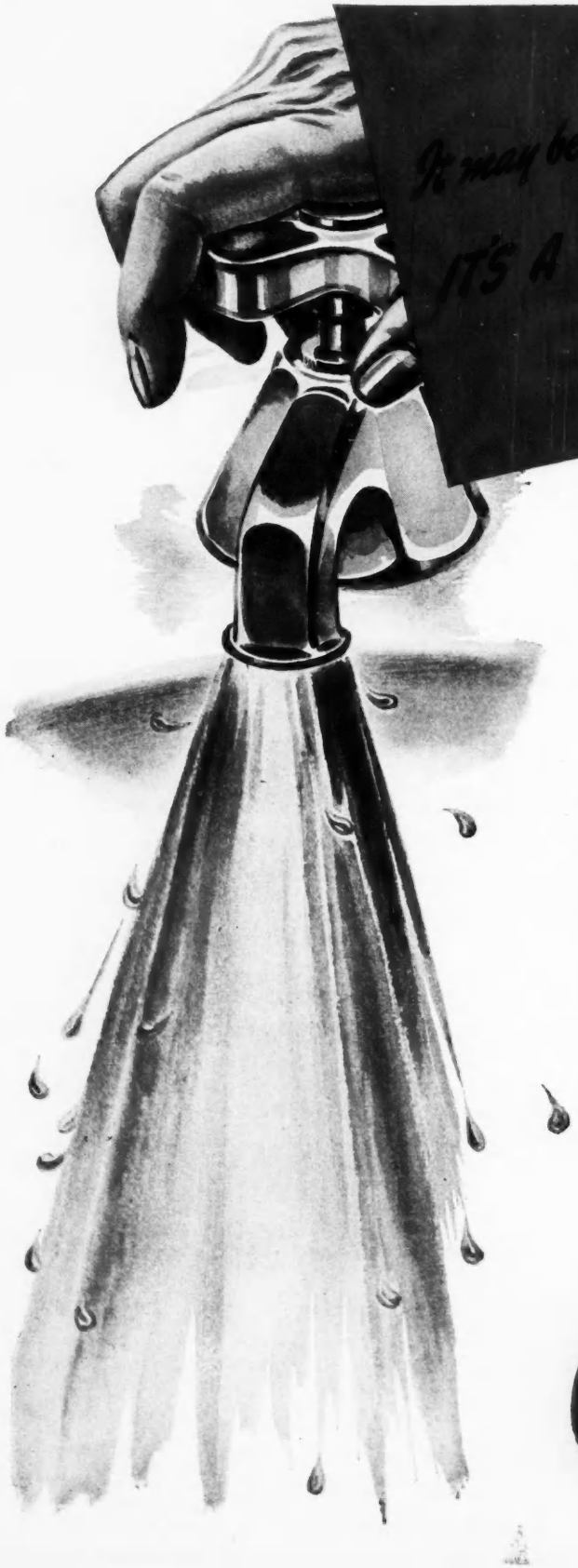

EVERY day our Bound Brook plant requires enough water to serve a good sized city. To us, this is something more than "just water."

Experience has shown that six distinct types are needed for efficient plant operation and to control the quality of Calco dyes and other chemical products. As many as nine different tests are required to safeguard a given grade for a specific use, and a large proportion of our water is tested daily. Every drop of distilled water used meets or exceeds U.S.P.X. standards, and the control of other types of acidity, turbidity, and freedom from metallic or other impurities is equally strict.

These extra precautions are a matter of daily routine at Calco for a simple, common-sense reason. Calco dyes can be consistently "better buys" only to the extent to which we control the quality of every material we use—including water.

CALCO CHEMICAL DIVISION
AMERICAN CYANAMID COMPANY
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AMERICAN
DYESTUFF REPORTER

VOLUME 31 DECEMBER 21, 1942 NUMBER 26

The Effect of Alkaline Treatments on the

FELTING PROPERTIES OF WOOL

JOSEPH W. CREELY and GEORGE C. Le COMPTE

THIS study was undertaken in order to find an explanation for the seemingly contradictory effects of alkalies on the feltability of wool as reported in the literature. Trotman[6] claims that aqueous solutions of borax and other alkalies tend to decrease the shrinkage of wool. On the other hand Trostel[5] has patented the use of weak alkalies in water solution for increasing the feltability of wool through a long soaking process in cold solutions. He recommends the use of a solution of lime of less than 0.5 per cent concentration and soaking the wool for days or even weeks, then after neutralizing, drying at less than 120° F. More recently Khaskin, Segeda and Sorokin[3] patented a somewhat similar treatment.

In a recent paper Freney and Lipson[2] have shown that sodium or potassium hydroxide in alcoholic solutions can be used to decrease the shrinkability of wool. They studied the use of various alcohols and came to the conclusion that the optimum treatment is to soak air dry wool of 12.0 per cent regain for one minute in 7 per cent potassium hydroxide in ethyl alcohol containing 1 per cent glycerol. The glycerol is used to prevent discoloration of the solution. The wool is best neutralized by a 5 per cent (by volume) solution of sulfuric acid in alcohol.

EXPERIMENTAL PROCEDURE

The following studies were made using a fine two ply wool yarn composed of approximately 70 per cent territory, 10 per cent pulled, and 20 per cent Texas wool. It was purified by extraction with petroleum ether and was backwashed with dilute aqueous ammonia.

The method of determining rate of felting used in this study was one previously described by the authors[4]. Briefly described the method is as follows: Samples of the wool yarn after having had known treatments are cut into lengths of approximately one meter and loops tied on each end. Three such lengths are placed in a three ounce cylindrical bottle containing 50 mls. of the felting bath. In these experiments 1 per cent sulfuric acid was used. The yarn is allowed to soak twenty minutes to allow internal stresses to be relieved before measuring its length. The length of the yarn is conveniently measured by hanging it from a small nail even with the top of a vertically supported meter stick. A small wire hook weighing three grams is placed on the bottom of loop of the yarn and the total length of the yarn read off the meter stick. Six lengths of yarn are taken for each sample and their average length called L_0. The yarn is removed from the meter stick, folded double four times, then placed in the bottle containing the felting bath and stoppered. The bottle is secured to a vane of an electric washer. For this work a temperature of 20°C. was used and it was unnecessary to add water and adjust its temperature in the washer. The washer is started and the bottles shaken for ten minutes. The yarn is removed, carefully untangled and again measured. The average of six such lengths is called L_{10}. The process is repeated for another ten minutes on the yarn samples and the average of the six lengths after they have been measured again is called L_{20}.

A vane of the washer used in this work oscillated through a third of a revolution. Its period was slightly more than one second. The radius of the arc traversed by the bottle was 12.5 cms. The machine used had three vanes and could accommodate six bottles; hence eighteen separate lengths of yarn could be used at one shaking.

S_{10} and S_{20} were defined by the following equations:

$$S_{10} = \frac{L_0 - L_{10}}{L_0}, S_{20} = \frac{L_{10} - L_{20}}{L_0} \qquad (1)$$

It was shown that the instantaneous rate of shrinkage $K_s = -\frac{1}{L}\frac{dL}{dt}$, was constant and could be calculated from S_{10} and S_{20} by means of the following equation:

$$K_s = 0.0576[2\log(1-S_{10}) + \log(1-S'_{20})] \qquad (2)$$

in this equation $S'_{20} = S_{10} + S_{20}$ and L is the length of yarn after having been shaken for time t. This equation is cumbersome so it is preferable to use a plot of K_s against S_{20}. This is plotted in Figure 1 using several different

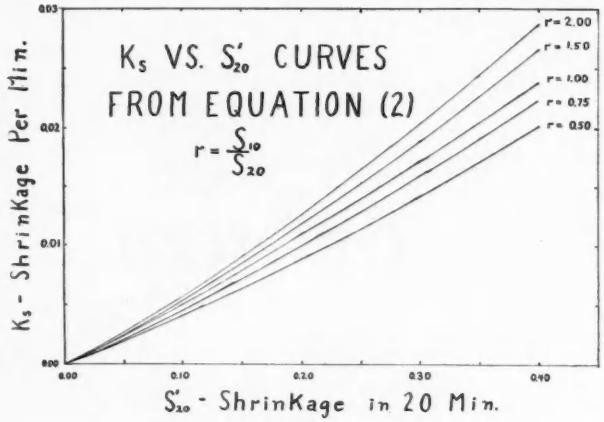

Fig. 1

ratios r of S_{10} to S_{20}. Using this it is possible to get fairly accurate values of K_s from the data with very little work. In preparing samples of wool yarn for testing; the ratio of bath to wool was held constant at 50 to 1. In all the figures in this paper concentrations are based on the weight of the bath rather than on the weight of the wool. Samples were prepared using the following alkaline treatments at a variety of concentrations and temperatures.

1. Aqueous solutions of alkalies
   a. Borax
   b. Sodium carbonate
   c. Sodium hydroxide
   d. Sodium hydroxide and sodium chloride
2. Alcoholic solutions of alkalies
   a. Methyl alcohol
   b. Ethyl alcohol
   c. Isopropyl alcohol
   d. n. butyl alcohol
   e. sec. butyl alcohol
   f. cellosolve ethylene glycol monoethyl ether)
3. Ammonia and its derivatives
   a. Ammonia
   b. Triethanolamine . .
   c. Monoethanolamine
   d. Aniline
   e. Morpholine
   f. Ethylene Diamine
   g. Trimethylbenzylammonium hydroxide
      (1) In water
      (2) In alcohol

RESULTS

Results obtained on samples of yarn treated with aqueous solutions of alkalies are all listed in Table 1. These samples were all rinsed thoroughly in running cold water and dried. These results show the following:

1. Increase of concentration of sodium carbonate, borax, or sodium hydroxide in the water solution used in treating the wool samples causes increase in the rate of felting K_s if the temperature is 20°C. or higher.

2. One per cent solutions of sodium hydroxide can be

TABLE 1

Treatment of Sample			K_s
Composition of bath	*Temperature of Bath*	*Time of Soaking*	
0.1% Borax	20°C.	30 min.	0.0060
1.0% Borax	20°C.	30 min.	0.0050
5.0% Borax	20°C.	30 min.	0.0069
0.1% Borax	60°C.	30 min.	0.0071
1.0% Borax	60°C.	30 min.	0.0073
5.0% Borax	60°C.	30 min.	0.0096
0.1% Borax	100°C.	30 min.	0.0139
1.0% Borax	100°C.	30 min.	0.0250
5.0% Borax	100°C.	30 min.	0.0257
0.5% Borax	20°C.	240 min.	0.0087
1.0% Borax	20°C.	240 min.	0.0100
2.0% Borax	20°C.	240 min.	0.0111
5.0% Borax	20°C.	240 min.	0.0120
0.1% Sodium carbonate	20°C.	30 min.	0.0079
1.0% Sodium carbonate	20°C.	30 min.	0.0093
5.0% Sodium Carbonate	20°C.	30 min.	0.0102
0.1% Sodium carbonate	60°C.	30 min.	0.0112
1.0% Sodium carbonate	60°C.	30 min.	0.0120
5.0% Sodium carbonate	60°C.	30 min.	0.0205
0.1% Sodium carbonate	100°C.	30 min.	0.0210
1.0% Sodium carbonate	100°C.	30 min.	0.0266
5.0% Sodium carbonate	100°C.	30 min.	0.0309
0.1% Sodium carbonate	20°C.	240 min.	0.0130
1.0% Sodium carbonate	20°C.	240 min.	0.0320
5.0% Sodium carbonate	20°C.	240 min.	0.0300
0.05% Sodium hydroxide.	20°C.	30 min.	0.0090
0.1 % Sodium hydroxide.	20°C.	30 min.	0.0089
0.5 % Sodium hydroxide.	20°C.	30 min.	0.0154
0.05% Sodium hydroxide.	60°C.	30 min.	0.0182
0.1 % Sodium hydroxide.	60°C.	30 min.	0.0190
0.5 % Sodium hydroxide.	60°C.	30 min.	0.0330
0.05% Sodium hydroxide.	100°C.	30 min.	0.0195
0.1 % Sodium hydroxide.	100°C.	30 min.	0.0290
0.5 % Sodium hydroxide.	100°C.	30 min.	wool destroyed
1% Sodium hydroxide	0°C.	1 min.	0.0049
1% Sodium hydroxide	0°C.	2 min.	0.0044
1% Sodium hydroxide	0°C.	5 min.	0.0069
1% Sodium hydroxide	0°C.	15 min.	0.0083
1% Sodium hydroxide	25°C.	1 min.	0.0063
1% Sodium hydroxide	25°C.	2 min.	0.0132
1% Sodium hydroxide	25°C.	5 min.	0.0224
1% Sodium hydroxide	25°C.	15 min.	0.0248
1% Sodium hydroxide	25°C.	30 min.	0.0320
1% Sodium hydroxide —Sat'd Salt	0°C.	1 min.	0.0042
1% Sodium hydroxide —Sat'd Salt	0°C.	2 min.	0.0045
1% Sodium hydroxide —Sat'd Salt	0°C.	5 min.	0.0051
1% Sodium hydroxide —Sat'd Salt	0°C.	15 min.	0.0049
1% Sodium hydroxide —Sat'd Salt	25°C.	1 min.	0.0039
1% Sodium hydroxide —Sat'd Salt	25°C.	2 min.	0.0047
1% Sodium hydroxide —Sat'd Salt	25°C.	5 min.	0.0046
1% Sodium hydroxide —Sat'd Salt	25°C.	15 min.	0.0062
1% Sodium hydroxide —Sat'd Salt	25°C.	30 min.	0.0116
1% Sodium hydroxide —Sat'd Salt	60°C.	15 min.	0.0178
5% Sodium hydroxide —Sat'd Salt	20°C.	2 min.	0.0199
5% Sodium hydroxide —Sat'd Salt	20°C.	10 min.	0.0258
Untreated	..	.. ..	0.0063

made to decrease the rate of felting of wool if applied for short periods of time and at low temperatures.

3. Saturation of one per cent solutions of sodium hydroxide with salt makes it possible to obtain somewhat greater effects in lowering the feltability of wool than if sodium hydroxide alone were used.

4. Increasing temperatures of treatment with alkaline solutions increases at the rate of felting of the treated wool.

Results obtained on samples of yarn treated with alcoholic solutions of alkalies are listed in Table 2. These samples

TABLE 2
Treatment of Sample

Concn. of Alkali.	*Alkali.*	*Alcohol*	*Temp. of Bath*	*Time of Soaking*	K_s
7.00%	KOH	Ethyl (95%)	20°C.	2 min.	0.0052
7.00%	KOH	Ethyl (95%)	20°C.	10 min.	0.0023
3.70%	NaOH	Methyl	20°C.	2 min.	0.0030
4.31%	NaOH	Isopropyl	20°C.	2 min.	0.0011
5.04%	NaOH	n. butyl	20°C.	2 min.	0.0014
0.98%	NaOH	sec. butyl	20°C.	2 min.	0.0012
2.18%	NaOH	Isoamyl	20°C.	2 min.	0.0047
2.80%	NaOH	sec. amyl	20°C.	2 min.	0.0028
3.02%	NaOH	Cellosolve	20°C.	2 min.	0.0040
Untreated	..	..	..	.. ..	0.0063

were neutralized in alcoholic 5 per cent sulfuric acid at room temperature, rinsed in water and air dried. Results indicate in general a decrease in rate of shrinkage for treated wool. Solutions of sodium hydroxide in isopropyl alcohol, n-butyl alcohol and secondary butyl alcohol appear to have the greatest effect. Further samples were shrunk in a bath of one per cent sulfuric acid and 0.02 per cent commercial wetting agent, $C_{17}H_{33}CONHC_2H_4SO_3Na$. This material has been found to have the property of increasing the rate of shrinkage of yarn when agitated in an acid bath containing it[1]. Results are shown in Table 3.

TABLE 3
Treatment of Sample

Concn. of Alkali	*Alkali*	*Alcohol*	*Temp. of Bath*	*Time of Soaking*	K_s*
4.31%	NaOH	Isopropyl	20°C.	2 min.	0.0044
5.04%	NaOH	n. butyl	20°C.	2 min	0.0035
0.98%	NaOH	sec. butyl	20°C.	2 min.	0.0046
Untreated	..	..	..	.. ..	0.0115

*K_s determined in felting bath containing 1 per cent sulfuric acid plus 0.02 per cent $C_{17}H_{33}CONHC_2H_4SO_3Na$.

Results obtained on samples of yarn treated with various ammonia derivatives are listed in Table 4. These results indicate either no effect for weak amines or an increase in the rate of felting for stronger amines. Trimethylbenzylammonium hydroxide, a base comparable in strength to sodium or potassium hydroxide, behaves like sodium hydroxide with the exception that no lowering of K_s is observed in water at O°C.

Efforts were made to evolve a theory in satisfactory agreement with the results summarized in Tables 1, 2, 3, and 4. Thus, Tables 1, 2, 3, and 4 indicated that alkalies acting on wool in the absence of water (i.e. the alcoholic solutions of KOH or NaOH), produced a considerable

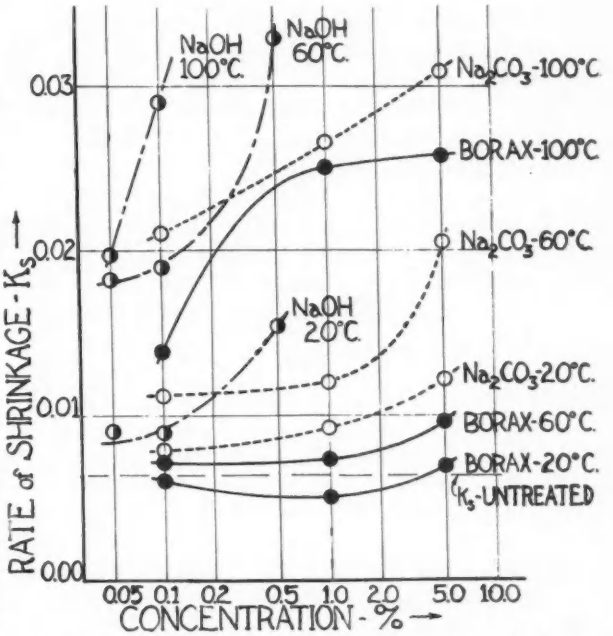

Figure 2—The effect of concentration, temperature and makeup of alkaline solutions upon the rate of shrinkage of treated wool.

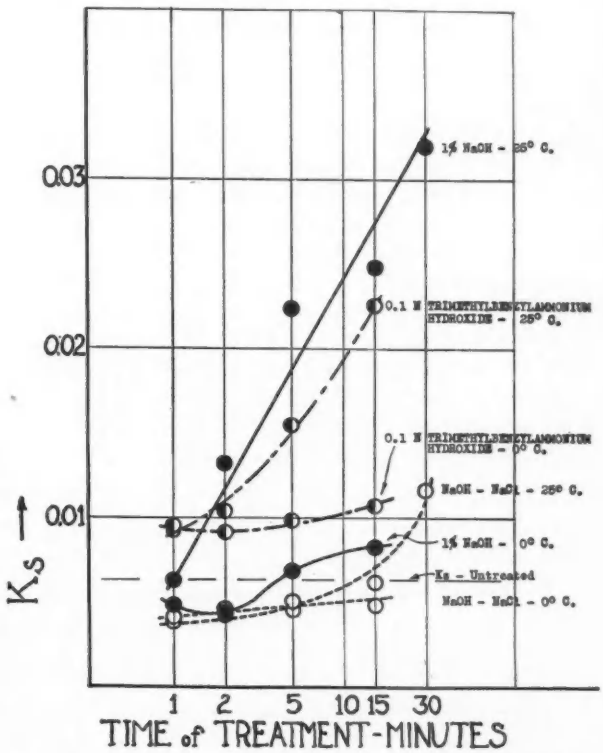
1% NaOH - 25° C.
0.1 N TRIMETHYLBENZYLAMMONIUM HYDROXIDE - 25° C.
0.1 N TRIMETHYLBENZYLAMMONIUM HYDROXIDE - 0° C.
NaOH - NaCl - 25° C.
1% NaOH - 0° C.
Ks - Untreated
NaOH - NaCl - 0° C.
Ks
0.03
0.02
0.01
1 2 5 10 15 30
TIME of TREATMENT-MINUTES

Figure 3—The effect of the time of treatment with alkaline solutions upon the rate of shrinkage of treated wool.

decrease in feltability; that alkalies reacting on wool in a relative deficiency of water (i.e. the NaOH solutions saturated with salt), produced a smaller decrease in felta-

bility; while the ordinary aqueous solutions of alkalies decreased feltability still less or else increased feltability. This suggested the possibility that wool could undergo two reactions with alkalies, one favored and the other inhibited by relative deficiency of water. Consideration of the reaction of peptide linkages with alkali indicated that water was involved during the reaction. On the other hand, alkali reacting with di-sulfide bonds apparently does not require water in the reaction and should produce it as an end-product.* This interesting difference between the two reactions led to our setting up the following relation as a possibility:

$$K_s = A - \frac{C_1}{P_1} \qquad (3)$$

where K_s is the instantaneous rate of shrinkage of a sample of wool, A is a constant of proportionality, and C_1 and P_1 are respectively the number of cross linkages and peptide linkages per gram of wool. Unfortunately, when the probable effects of various chemicals such as chlorine, sulfuryl chloride, acids, hydrogen peroxide, cold aqueous alkali, warm aqueous alkali, and alcoholic alkali on peptide and di-sulfide linkages were set down, the effects on shrinkage predicted by equation (3) showed rather poor correlation with the known effects. There was considerable uncertainty about the relative effects on the two types of linkages of the chlorine, sulfuryl chloride, hydrogen peroxide, and alkali treatments so that the poor correlation obtained may possibly be due to the present insufficient knowledge of the chemistry of wool. At any rate the theory did not appear completely satisfactory and further attempts were made to develop a consistent theory.

As stated before, our experimental results indicated that in treating wool with alkaline solutions, lowering the concentration of water in the solutions resulted in the possibility of attaining decreased shrinkability in the wool. It appears reasonable to interpret this on the basis of the depth to which alkaline solutions could affect wool fibers under limited time of treatment. It might be supposed that if wool is attacked chiefly on the surface of the fiber an unshrinkable effect would be produced, but that if conditions are such as to affect the interior of the fibers as well as the surface K_s would be increased. The facts that wool exhibits decreased swelling in alcoholic alkali solutions, in cold aqueous caustic solutions, and in strong salt solutions containing caustic, and that short time of treatment all tend to lead to decreased shrinkage and all favor a surface reaction, support this theory. On the other hand, microscopic examination did not show any change in appearance of the scales on wool fibers treated with alcoholic alkaline baths.

A more satisfactory test of this theory can be based on the following reasoning. If the surface action theory is valid it would be expected that a series of short exposures to alkalies, each followed by neutralization, would produce a greater lowering of K_s than a single long treatment quivalent in time to the sum of the times of the short exposures. The first experiments were run on 1.0 per cent NaOH solutions in water at 25°C. These were found to cause only an increase in rate of felting when the wool was soaked in the bath in a single long treatment. Table 5 shows results for a series of five second treatments in 1 per cent NaOH at 25°C., each followed by neutralizing. There is a small lowering of K_s which is probably not significant.

(Concluded on page 682)

TABLE 4
Treatment of Sample

Concn. of Amine	*Amine*	*Temp. of Bath*	*Time of Soaking*	K_s
30%	30% Aqua ammonia	20°C.	30 min.	0.0083
100%	Triethanolamine	20°C.	30 min.	0.0069
100%	Monoethanolamine	20°C.	30 min.	0.0078
100%	Aniline	20°C.	30 min.	0.0069
100%	Morpholine	20°C.	30 min.	0.0090
60%	Ethylene diamine	20°C.	30 min.	0.0142
2.5n	Trimethylbenzylammonium hydroxide in water	25°C.	1 min.	0.0074
2.5n	Trimethylbenzylammonium hydroxide in water	25°C.	2 min.	0.0045
0.1n	Trimethylbenzylammonium hydroxide in ethanol (95%)	25°C.	1 min.	0.0061
0.1n	Trimethylbenzylammonium hydroxide in ethanol (95%)	25°C.	2 min.	0.0061
0.1n	Trimethylbenzylammonium hydroxide in ethanol (95%)	25°C.	5 min.	0.0058
0.1n	Trimethylbenzylammonium hydroxide in ethanol (95%	25°C.	15 min.	0.0049
0.1n	Trimethylbenzylammonium hydroxide in water	25°C.	1 min.	0.0095
0.1n	Trimethylbenzylammonium hydroxide in water	25°C.	2 min.	0.0104
0.1n	Trimethylbenzylammonium hydroxide in water	25°C.	5 min.	0.0135
0.1n	Trimethylbenzylammonium hydroxide in water	25°C.	15 min.	0.0226
0.1n	Trimethylbenzylammonium hydroxide in ethanol (95%)	0°C.	1 min.	0.0063
0.1n	Trimethylbenzylammonium hydroxide in ethanol (95%)	0°C.	2 min.	0.0063
0.1n	Trimethylbenzylammonium hydroxide in ethanol (95%)	0°C.	5 min.	0.0068
0.1n	Trimethylbenzylammonium hydroxide in ethanol (95%)	0°C.	15 min.	0.0058
0.1n	Trimethylbenzylammonium hydroxide in water	0°C.	1 min.	0.0094
0.1n	Trimethylbenzylammonium hydroxide in water	0°C.	2 min.	0.0092
0.1n	Trimethylbenzylammonium hydroxide in water	0°C.	5 min.	0.0099
0.1n	Trimethylbenzylammonium hydroxide in water	0°C.	15 min.	0.0107
Untreated		..	.. ..	0.0063

*Note—The reactions between wool and alkalies which we accepted as the most probable in the light of our present knowledge of the structure of wool were as follows:

$$R\text{—}S\text{—}S\text{—}CH_2\text{—}R^1 + OH^- \rightarrow RS^- + HOSCH_2R^1$$
$$HOSCH_2R^1 \rightarrow H_2S + R^1CHO$$
$$H_2S + OH^- \rightleftharpoons HS^- + H_2O$$
$$HS^- + OH^- \rightleftharpoons S^= + H_2O$$

In these reactions R and R^1 are two points of juncture of this —S—S—CH_2— bridge with the wool molecule.

The reactions with the peptide linkage were assumed to be the following:

$$R\text{—}C(=O)\text{—}NH.R^1 + OH^- \rightleftharpoons R\text{—}C(-O^-)=N.R^1 + H_2O$$
$$R\text{—}C(-O^-)=NR^1 + H_2O \rightarrow RC(-O^-)=O + R^1NH_2$$

Again R and R^1 represent two points of juncture of the group with the wool molecule.

• BOOK REVIEWS •

Textile Fiber Atlas—*A Collection of Photomicrographs of Common Textile Fibers, by Werner Von Bergen and Walter Krauss. Published by American Wool Handbook Company, 303 Fifth Avenue, New York, N. Y. Price* $3.00.

It has long been recognized that the microscope plays a very important part in the textile industry. Without its use many perplexing problems of the textile chemist would go unsolved, many causes of damage would be undetected, and the admixture of adulterant fibers could not be determined.

The authors have rendered a great service to the textile industry by bringing together in one volume more than 300 photomicrographs of fibers obtained from authoritative sources. These are accompanied by thirty-eight pages of text, which give valuable information regarding their identification.

The following is quoted from the author's Preface:

"The purpose of this Atlas is to present for the first time, a set of photomicrographs of all important textile fibers. The idea originated from a series of photomicrographs used in the Forstmann Woolen Company Laboratory for the identification of wool and related fibers. The only Atlas we know of, covering the vegetable fibers, was published by A. Herzog in Munich in 1908. The Atlas in its present form is the result of combining the entire series of plates and articles which were published in the Rayon Textile Monthly during 1940 and 1941. Due to present conditions and the fact that the authors are engaged in defense work, the Atlas is not as complete as originally planned. However, so many requests for complete sets of this series of articles have been made, that it was decided to revise the articles and to reprint them in a loose leaf form. This form enables the preparation, from time to time, of new and supplementary plates which may be purchased and added to the Atlas to keep it up to date.

The text is, as much as possible, limited to a description of the properties that can be established microscopically since a number of excellent books on textile microscopy such as "Textiles and the Microscope" by Dr. E. R. Schwarz, give the necessary details in regard to microscopical technique.

The table showing the comparable scale for fineness of various textile fibers which was prepared for the first edition of the American Wool Handbook has been carefully revised.

A chart, illustrating the direct relationship between wool grades and the various staple fibers will, no doubt, be of special value."

The nomenclature, prolons and synthons, given to man-made protein fibers and to nylon and vinyon may be revolutionary. Prolon has been suggested as a generic term for fibers made from a natural protein base by F. C. Atwood of Atlantic Research Associates. Synthon was suggested as a generic term for fibers made from organic substances which in turn have been synthesized from simple raw materials, by Dr. H. deWitt Smith.

Nuevo Diccionario Tecnico Comercial — (*New Technical and Commercial Dictionary*). *Compiled by Antonio Perol Guerrero. Published by Chemical Publishing Co., 234 King Street, Brooklyn, N. Y.* 1942. *Price* $10.00.

This book consists of three parts—

Part I—Spanish-English
Part II—English-Spanish
Part III—Conversion Tables of Weights, Measures and Monetary Units.

It is a technical and commercial dictionary and contains more than 50,000 words used in the various branches of science, engineering, manufacturing and commerce.

In view of the increasing friendly relations existing between the United States and Latin America, we believe that this dictionary will be found of considerable value to those who are having any technical, industrial and commercial relations with any of the Pan-American countries.

Labor Arbitration—*Principles and Procedures by John A. Lapp, LL.D. 236 pages. Price* $3.50. *Published by National Foremen's Institute, Inc., Deep River, Conn.*

The author of this book has served as an impartial arbitrator on more than 400 cases of all types of industrial disputes during the past ten years.

Some of his past services were rendered in the capacity of chairman of the Coal Labor Board, Petroleum Labor Policy Board; head of labor relations, Public Works Administration; labor advisor, Rural Electrification Administration and many other similar offices. He is therefore well qualified to write upon this subject.

To quote the author: "Arbitration of labor disputes has come through the formative stages during which doubt and suspicion clouded its benefits. It has now arrived at a place of major importance and significance as an instrument not only to settle labor controversies, but for the promotion and preservation of harmonious labor relationships in industry and commerce. It is particularly in a place of first importance during the war period when strikes are foresworn in place of peaceful means of adjustment of controversies between employers and employees."

Strategic Materials in Hemisphere Defense *by M. S. Hessell, W. J. Murphy, and F. A. Hessell. 235 pages. Price* $2.50. *Published by Hastings House, New York.* 1942.

The authors of this book have made a successful effort

to bring together in a convenient sized volume, a descriptive and economic discussion of all materials essential to the successful conduct of the present war.

The war has brought home to Americans for the first time their lack of preparation, and the meagerness of their stock piles of absolutely essential materials.

This book makes clear to every reader the complex story of supply and discusses the fourteen strategic and fifteen critical materials needed by the army. They are as follows:

Rubber, Tin, Manganese, Graphite, Chromium, Nickel, Tungsten, Vanadium

Aluminum, Asbestos, Mercury, Antimony, Mica, Quartz Crystal, Platinum, Optical Glass, Phenol, Toluol

Quinine, Iodine, Opium, Cork, Kapok, Coconut, Shell Char

Textiles, Leather

Jute, Manila Hemp, Sisal.

The second half of the book discusses the geographical locations of such materials as are still available.

Many pictographic diagrams have been used to translate statistics into visual comparisons, which will stick in one's memory.

Special emphasis is placed upon consumer goods, and the effect upon the home and average citizen. An extensive bibliography has been introduced at the end of the book for the benefit of those who wish to study the subject further.

Industrial Chemistry. *(An elementary treatise for the student and general reader.) Fourth Edition. By Emil Raymond Riegel, Ph.D., Prof. of Industrial Chemistry, University of Buffalo, with the support of a large number of collaborators.* 861 *pages,* 294 *figures. Reinhold Publishing Corporation.* 1942. *Price* $5.50.

With the rapidly expanding application of chemistry in industry, the writing of a book covering the whole range of industrial chemistry, has become increasingly difficult. Minute detail must necessarily be omitted, yet great care must be taken not to overlook the fundamental processes, the principles applied, and the raw materials used.

The author and his collaborators have been successful in writing a well-balanced text book, which should give the student of industrial chemistry an excellent survey of the subject as a whole. Each chapter is accompanied with reading references, which should make it readily possible for the individual reader to secure more advanced and detailed information regarding the subjects in which he is especially interested.

In the present edition the author has endeavored to bring up to date such subjects as are of especial interest as regards the war effort, as for instance, the manufacture of synthetic rubber, the process of hydroforming petroleum fractions, the manufacture of aluminum and magnesium metals.

The book is highly recommended as a text book for college students of industrial chemistry and for those who wish to review and bring up to date their knowledge of the subject.

Mercerising*—by J. T. Marsh, M.Sc., F.T.C., F.T.I.* 458 *pages,* 265 *figures and numerous tables. Published by D. Van Nostrand Company, Inc.,* 250 *Fourth Avenue, New York City.* 1942. *Price* $9.00.

To most textile chemists the term mercerization immediately brings to mind one of the romances of science and industry. It began in 1844 when John Mercer, an English calico printer, while attempting to filter a solution of caustic soda through a piece of cotton cloth noticed that although the solution passed through rapidly at first, it always went through slower and slower and finally almost entirely stopped. This observation led to the patenting in 1851 of a process of treating cotton yarn and cloth with caustic soda solution to improve them, particularly as to increase strength, durability, and capacity for absorbing dyes. The process soon became known as mercerization.

It was not until 1899, however, that the most valuable application of mercerization was discovered. At that time Horace Lowe and other experimenters found that if yarn and cloth were mercerized under tension that a high luster was obtained. Adaptation of this treatment led to modern mercerization which for many years has been one of the most important processes of cotton finishing.

Probably no process in textile finishing has engaged the attention of so many textile chemists in the study of the phenomena of mercerization, its causes, methods of control and improvement.

The author of this book has brought together in one volume the important knowledge available in regard to all phases of this subject not only chemical and physical, but also the mechanical application of the finishing industry.

While other chemicals such as zinc chloride and sulfuric acid have been patented and used to some extent, the author has confined his attention to the treatment of cotton with caustic soda with minor mention made of its action on linen and rayon.

The text is well arranged, thoroughly illustrated and systematically divided into sub sections as follows:

Part One—Historical Introduction

Part Two—Cotton

Part Three—The Mercerizing Process

Part Four—Native Cellulose and Hydrate Cellulose

Part Five—Theoretical Aspect of the Action of Alkali

Part Six—Absorptive Capacity

Part Seven—The Efficiency of the Process

(Continued on page 681)

PROCEEDINGS OF THE

American Association of Textile Chemists and Colorists

DECEMBER 21, 1942

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Members should notify the **Secretary** immediately of all address changes.

RECEIPTS FOR DUES

RECEIPTS have been mailed for dues paid in October and November. If you have paid your dues, and have not received receipt, kindly notify the Secretary.

MEETING, PHILADELPHIA SECTION

A MEETING of the Philadelphia Section was held on December 4th at the Hotel Philadelphian. There were 105 present at the dinner, and 20 more persons attended the after dinner lectures which were given by H. E. Millson and Dr. G. L. Royer, both of Calco Chemical Company.

Their subject was "Microscopic Observation of Union Dyeing," which proved to be very interesting. Afterwards they showed slides, demonstrating the verbal contents of their lecture.

Among the guests present were Colonel Frank M. Steadman of the Philadelphia Quartermaster's Depot, Major L. H. Roane from the Piedmont Section, and Bryant Shoemaker of the United States Marine Corps, son of George Shoemaker who is a member of the Philadelphia Section. Bryant Shoemaker had just returned from the Guadalcanal zone.

The following officers were elected for the year 1943:-

Chairman, James P. Conaway; Chairman Emeritus, Elmer C. Bertolet; Vice-Chairman, George E. Kohn; Treasurer, Arthur W. Etchells; Secretary, Boyce C. Bond; Councilors—Arthur E. Jones, John F. McCoy and Wm. Ebersold; Sectional Committee, John A. Levering, Walter Fancourt, 3rd, Curt Baeringer and William Stringfellow.

Respectfully submitted,

BOYCE C. BOND, *Secretary.*

MEETING, NEW YORK SECTION

THE last meeting of the New York Section was held on Friday evening, December 4th, at the Downtown Athletic Club, New York City. The chairman, Patrick J. Kennedy, designated the evening as "Navy Night," honoring in a small but sincere way the Navy and her brave officers and men.

Emmett Driscoll, chairman of the technical program committee, referred to the subjects for discussion at future meetings which include a meeting on resins on January 29th and one on rayons on March 5th.

"Dyeing Woolen Piece Goods for the Navy" was the subject for this meeting and there were three speakers as follows:

Lt. Cmdr. W. F. Prien, U. S. Navy, "General Requirements and Specifications."

Roland E. Derby, the Derby Co., "Piece Goods Dyeing with Leuco Ester of Indigo."

George O. Linberg, E. I. du Pont de Nemours & Co., Inc., "Continuous Piece Goods Indigo Dyeing Process."

These papers proved of considerable interest and were followed by discussion on numerous items.

The attendance was 215.

Respectfully submitted,

NORMAN A. JOHNSON, *Secretary.*

MEETING, SOUTHEASTERN SECTION

JOHN P. HARRISON, Dundee Mills, Griffin, Georgia, was elected Chairman of the Southeastern Section at the section's annual meeting in Atlanta on Saturday, Nov. 11th. He succeeds Robert J. McCamy, of Pepperell Manufacturing Company, Lindale, Georgia, Mr. McCamy refusing an extra term due to the pressure of business and a change in position.

Robert W. Philip, Editor of Cotton, was elected Councilor and O. G. Edwards, Avondale Mills, Sylacauga, Alabama, was elected Vice Chairman. Lee L. Baker, Secretary, and George Dozier, Treasurer, were re-elected.

George E. Missbach, F. H. Ross & Company, Atlanta; John E. Smenner, Eagle & Phenix Mills, Columbus, Georgia; Arthur W. Picken, E. I. Du Pont De Nemours & Company, Columbus, Georgia; Robert Harrold Nuttal, Lanett Bleachery, Lanett, Alabama, were newly elected to the sectional committee. Walter H. Jackson, National Aniline & Chemical Company, Columbus, Georgia; M. T. Johnson, Callaway Mills, LaGrange, Georgia; and L. E. Whittelsey, Southern Dyestuff Corporation, Macon, Georgia were re-elected.

In the technical session of the meeting, L. E. Whittelsey read the paper on raw stock cotton dyeing with or without salt; also, an inspirational talk was given by the Hon. George B. Hamilton, Treasurer of the State of Georgia.

Respectfully submitted,

LEE L. BAKER, *Secretary.*

CALENDAR OF COMING EVENTS

Meeting, Northern New England Section, January 15, 1943.

Council and Research Committee Meetings, January 16, 1943, Boston, Mass.

Meeting, Philadelphia Section, January 22, 1943.

Meeting, New York Section, Downtown Athletic Club, January 29, 1943.
Subject: "Application of Resins and Plastics to Textiles."
Speakers: Carl W. Patton, Carbide & Carbon Chemicals Corp. and William Butler, Bakelite Corp.

General Business Meeting (in conjunction with New York Section meeting) April 16, 1943, New York City.

Council and Research Committee Meetings, April 17, 1943, New York City.

Technical Notes of Interest to
HOSIERY AND YARN DYERS*

C. B. ORDWAY
Technical Dept., American Aniline Products, Inc.

TEXTILE chemical specialty assistants have been continually introduced into the dyeing and finishing industry ever since the days of the Pharaohs of Egypt and Kings of Persia. Secrecy, mystery, and a large amount of ritual and hokum was always attached to the use of these products. Information was handed down from father to son and in England the Guilds held all such information as most secret. Gradually through the investigation and publications of such textile chemical authorities as Perkin, Matthew, Olney, Loewenthal, Whittaker, and others, the textile dyeing and finishing plant workers have been given the technical reasons for the application of various chemical assistants.

Though the technical information is available for the dyer and chemist, in many a case "we" are all guilty of not making the effort to find out the real technical facts about various dyeing and finishing operations, before jumping into the "middle of a job."

There are two types of specialty assistants with which every dyer comes in contact to a certain degree and from both technical as well as plant angles it is very valuable to have some notes on them. These agents may be grouped under the commonly known headings by which they are known in the industry.

1. Mordants and aftertreating agents.
2. Coupling agents for "para" type of colors and desirable assistants.

Mordants and aftertreating agents are usually thought of as two distinct groups when in reality the term "aftertreating agent" applies to a mordant that is applied after a direct color has been applied to the yarn or hose. A mordant is usually thought of as a chemical that is applied to the goods before the dyeing operations. Mordants can be grouped into two classes:

1. Mordants forming "color lakes" which are insoluble compounds with the dyestuff on a fiber. These are sometime classed as so-called mordants or known as fixing agents. This is a chemical combination and illustrates the action of copper sulfate (bluestone) and sodium bichromate on special direct colors. Such mordanted or aftertreated colors may not be fast to both acid and alkaline conditions.

2. True mordants are chemicals that combine with dyestuffs on the fiber to form new chemical compounds which are less soluble and possess other differences in chemical and physical properties from original dyestuffs. Formaldehyde and cation compounds are two of the better known and more widely used chemical groups illustrating this class of mordanting agent.

There are numerous other mordanting agents, the acid mordants such as the tannins and fatty acid compounds (Turkey Red) which are used in the mordanting and dyeing of basic and acid dyestuffs. Additional basic mordants such as the aluminum, iron, and heavy metallic compounds have found their greatest use in printing.

The chief things that are of practical value to know about these agents are:

1. What property of the direct color is improved and how permanent is that improvement?
2. What other properties of the treated color are affected and how?
3. Most practical method of application to serve maximum improvement of color.
4. Why does the dyestuff react with the aftertreating agent?

Taking up these specialty agents from a technical point, the reason for their use on the colors may be explained.

Aftertreating Direct Colors with Copper Sulfate—There are certain direct colors that chemically have an affinity for copper compounds when applied in an acid bath and the light fastness of these direct colors is usually improved. Certain direct colors aftertreated with bichromates show improved wash fastness. This is brought about through the formation of a "color lake." On a majority of direct colors aftertreated with copper and bichrome, their improved light and wash fastness can be destroyed if the treated dyed goods are given a subsequent alkaline treatment. So these two may be considered very temporary aftertreatments.

Formaldehyde Colors—The aftertreating with formaldehyde of direct colors possessing two hydroxyl or amino groups in the meta structural positions of the end compounds will give greatly improved fastness to washing and perspiration without affecting the other properties of the color. Through extended research and development American Aniline Products, Inc. has developed a complete range of formaldehyde aftertreatable direct colors known

*Presented at meeting, South Central Section, October 10, 1942.

as Formanils. The Formanils may be dyed directly on cotton and viscose rayon hosiery, yarns, and piece goods then aftertreated with formaldehyde or Amaform R (an aldehyde salt).

Whenever hosiery and yarn dyers wish to obtain better wash and perspiration fastness, Formanils aftertreated with Amaform R are proving very helpful as they give the dyer short processes without the necessity of using developed colors to obtain the improved wash and perspiration fastness.

Cation agents may be classed as "colorless direct colors or mordants." Some types are applied to direct dyed goods in a neutral bath. Plant application of these products shows improved fastness to cold water and in some cases to wash fastness, though a dyer must be careful to select his colors as the light fastness of some direct colors is affected adversely by these agents.

Coupling Agents for "Para" Type of Colors—The word "para" is not used here as a brand name but to designate direct dyeing colors that possess one or two amino groups located in correct structural components whereby they possess stability when coupled with selected diazotized Fast Color Bases or Stabilized Fast Color Salts. A typical color of this group is Amanil Toluylene Orange R, which may be dyed directly on cotton or viscose rayon yarn and hose, rinsed and coupled directly with such Fast Color Salts as:

Fast Red 3 GL Salt
Fast Scarlet 2G Salt
Diazotized Fast Red GG Base (paranitraniline).

It has been found due to the varying water supplies that it is highly desirable to use a small amount of Stabilon in these coupling baths. Stabilon is a dispersion agent which is stable in the presence of organic and mineral acid and aluminum, magnesium, and calcium salts. The use of this agent also improves the penetration and levelness of package dyed yarns using "para" colors. Selected "para" colors and coupling agents give very good wash fastness for hosiery, underwear, and yarns but do possess only fair fastness to light.

UNEMPLOYMENT REGISTER

Members of this association, who are without employment, should forward to the secretary a statement as to their qualifications and experience. This information will subsequently appear on these pages with an identifying key number. Employers are also requested to file with the American Dyestuff Reporter any vacancies which may occur in their business.—H. C. Chapin, Secretary, Lowell Textile Institute, Lowell, Mass.

Key: A—Laboratory and research; B—Dyeing or printing; C—Finishing; D—Sales; E—Instruction; F—Executive.

NOTE: PERSONS WHO HAVE OBTAINED EMPLOYMENT SHOULD NOTIFY THE SECRETARY OR THE AMERICAN DYESTUFF REPORTER AT ONCE.

A-3

Education—B.S. in chemistry, Lehigh University.
Experience—Experimental engineer and analytical chemist, 8 mos.; assistant superintendent of silk corporation, assisted in planning and directing production, in charge of laboratory, technical work, personnel, purchasing, etc., 2 years; inspector of ordnance material, to the present. Seeks position as chemical engineer or chemist.
Age 25; single; references.

A-B-18

Education—Graduate Philadelphia Textile School, 1940.
Experience—Has experience as assistant chemist and trouble shooter in silk dyeing and finishing plant; as manager of laundry store; and as printer and colorist in screen printing plant. Seeks position in laboratory and research, dyeing, printing or finishing
Age 21; single; references.

A-B-C-F-3

Experience—Broad experience since 1906 as overseer of finishing, general researcher, trouble shooter, overseer of dyeing, general superintendent, mill manager. Experienced in woolen, worsted, cottons, unions and mixtures. Recently specialized in men's wear cottons. Seeks position as overseer of finishing or dyeing, assistant superintendent, superintendent or manager.
Age 53, married; references.

B-10

Education—2 years chemistry, 2 years textile chemistry and dyeing, Lowell Textile Institute, evenings.
Experience—4½ years dyeing and bleaching hosiery, specializing in children's and infants' hose; 3 years assistant dyer, dyeing and bleaching cotton, mercerized and unmercerized, wool, wool-cotton, wool-rayon and wool-silk hose. Seeks position as second hand, assistant dyer or laboratory assistant in hosiery mill.
Age 27; single; references.

B-D-1

Education—High school graduate; textile chemistry, Textile Evening High School, New York City; accounting; typist.
Experience—from 1935 to present employed as colorist with screen printing plant in New York City. Experienced with all types of fibers and all types of dyes. Shade matching. Versed in accounting, typing, modern office procedure and sales promotion. Able assistant to busy executive. Age 46; single; references.

C-1

Experience—Experienced as assistant finisher, finisher and superintendent of finishing since 1923. Experience on automobile cloth, boucle overcoatings, high grade men's wear worsted, low grade woolens, medium grade plaid-back overcoatings, fleece finish overcoatings, Bolivias, kerseys, medium-grade men's piece dye suitings, uniform cloth, flannels, ladies' dress goods and coatings, government serge and elastique fabrics, marine wool, flannel shirtings.
Age 37; married, 3 children; references.

A. P. HOWES
Publisher

MYRON D. REESER
Advertising Manager

AMERICAN DYESTUFF REPORTER

LOUIS A. OLNEY, D.Sc.
Directing Editor

NORMAN A. JOHNSON, B.T.C.
Managing Editor

VOLUME 31 | DECEMBER 21, 1942 | NUMBER 26

The customary greetings of the season seem incongruous at this wartime Christmas. Seldom has the world held more misery. Superficially there is little to celebrate and much to deplore.

But if we search beneath superficialities we find definite ground for hope that a new era is dawning.

Although immediately concerned with victory for our arms, a prerequisite to world regeneration, we find leaders of enlightened thought in all the Allied Nations voicing unaccustomed aims for peoples at war: Not conquest, not annihilation of the enemy, but the development of a post-war society wherein all mankind—victors and vanquished alike—shall share a richer, freer, happier existence.

And although these high ideals may fail of realization because of lack of unanimity in high councils, it is amazingly encouraging that they should be voiced by even some in authority.

Led by these voices, the peoples of the world are definitely striving to evolve a new and better order—the true brotherhood of man. That such a millenium will be achieved within our lifetime is perhaps too much to hope. But the trend is clear.

When we ponder deeply on these things we can be truly heartened. Never was a goal more worthy, never were sacrifices better justified. And if we persist unitedly and steadfastly on this course the ultimate attainment of the goal is assured.—A. P. H.

• PLASTICS FOR ARMY TENTS

Army tents are now being improved to a degree undreamed of only a year ago through the application of plastics to the duck from which tentage is made, according to the War Department.

The improved process was developed by the Quartermaster Corps which procures duck for all branches of the government as well as for various arms and services of the War Department. The development of the improved process came as a result of the cooperation of the textile finishing industry and leading plastic manufacturers with technical personnel of the Quartermaster Corps. This development is considered by many to be the outstanding utilization of plastics in the war program.

The procedure involves the application of a plastic composed of esterified rosin combined with phenol formaldehyde resins to ordinary duck material as a part of the fire resistant, weather resistant and mildew resistant compounds previously applied. The plastics component of the compound greatly increases the life of the duck material, improves its water permeability and protects the fire resistant finish against weathering or deterioration in storage.

The value of the plastic addition is greatly enhanced by its ready inclusion in compounds already in use so that the entire protective coating of the tentage can be handled in one relatively simple operation. The compound, fortified by the plastic addition, may be applied with a pad or spread with a knife and dried either over cans or by festooning, as is now practiced.

The newly developed plastic formula is said to have a number of distinct advantages. Not the least of these is the low cost, made possible primarily by the use of rosin which is obtainable in large quantities from pine trees at very little expense, but that it affords a saving by acting as an extender in the use of phenol formaldehyde resins.

Quartermaster Corps officials also have found it to be a valuable addition to paints and varnishes as a protective coating and it is expected that a number of other uses will be developed.

Somewhat more than a year and a half ago Quartermaster Corps technicians began an intensive study of ways and means of improving Army tentage and succeeded in obtaining various finishes that would give the maximum water, weather, fire and mildew resistance to heavy tentage. At the beginning of the study chlorinated rubber was the only film forming material used to enhance these qualities. A number of other plastic materials were utilized from time to time such as ethyl cellulose, vinyl resins such as is utilized in Koroseal. The new plastic completely displaces chlorinated rubber and provides an improved finish over the formulas where chlorinated rubber is used, thereby releasing that strategic and critical material for other uses in the war effort while at the same time providing longer life and better water repellency to Army tentage, which includes tents, tarpaulins, and truck covers.

Not only is the new plastic cheaper than chlorinated rubber but it is also cheaper than ordinary plastics because it requires less phenol than most other formulae. It is estimated that approximately 10 million pounds will be used in Army tentage during the coming year.

• RAYON PRODUCTION

United States production of rayon in 1942 will probably approximate 625,000,000 pounds, setting a new production record, it was stated recently by William C. Appleton, president, American Viscose Corporation. This volume compares with an output of 573,000,000 pounds in 1941 and 471,000,000 pounds in 1940. The increase in production this year has been moderate, since the industry has not been able to obtain new equipment and machinery.

Of the total output, about 470,000,000 pounds will consist of continuous filament rayon yarn. This compares with 451,000,000 pounds in 1941 and 390,000,000 pounds in 1940. The balance of the production, approximately 155,000,000 pounds, will be rayon staple fiber, the short fibers from which spun rayon yarns and fabrics are made. This year's output of staple fiber will compare with a production of 122,000,000 pounds in 1941 and 81,000,000 pounds in 1940. The rapid increase in the output of rayon staple fiber in recent years has been due to the continual development of new uses for this product in fabrics for men's and women's wear and in such other articles as rugs and carpets, blankets, tablecloths and home furnishings.

A substantial portion of the American industry's current production of continuous filament rayon yarn is being used in the manufacture of military equipment or is allocated by Government order to the hosiery industry and for export to Latin American countries under the Good Neighbor Policy. The principal military equipment containing rayon includes fragmentation bomb chutes, aerial cargo delivery chutes, flare chutes, parachute shroud cords and tapes, self-sealing gasoline tanks and feed lines, aerial tow targets, water- repellent cloths to protect airplane motors, electric wire insulation in submarines, other naval vessels, tanks and planes, officer's uniform linings and Army insignia.

The remainder of the industry's yarn production and the greater part of the output of rayon staple fiber is still available for civilian use.

• DCAT SECTION ANNUAL MEETING

The Drug, Chemical and Allied Trades Section of the New York Board of Trade held its 52nd Annual Meeting and Election at the Drug and Chemical Club, 85 John Street, on November 17, with approximately 125 executives present. S. B. Penick, Jr., President of S. B. Penick & Company, and Chairman of the Section, presided at the meeting featured by the address of Frank A. Delgado, Chief of the Drugs, Fine Chemical and Health Supplies Section of the Office of Price Administration.

The various officers of the Section including the Chairman; Robert B. Magnus, Treasurer; Carl M. Anderson, Counsel; and John C. Ostrom, Secretary; reported on the work of the Section during the past year. Harold M. Altshul, Chairman of the Membership Committee, reported a total of 68 new members for the year stating that the roster now includes some 385 member firms.

With the approval of the report of the Nominating Committee the following individuals were elected to serve on the Executive Committee for the coming year. At the first meeting of this committee, which will be held shortly, the Section's officers for next year will be elected. F. J. McDonough, President of N. Y. Quinine & Chemical Works, was re-elected the Section's Representative on the Board of Directors of the New York Board of Trade.

Carl M. Anderson, Merck & Co., Inc.; Harold M. Altshul, Ketchum & Company; C. C. Caruso, Schieffelin & Company; Hugh Crosson, McKesson & Robbins, Inc.; James DeCesare, White Laboratories, Inc.; Grover C. Hollings, Eli Lilly & Company; R. J. Ingram, Bristol-Myers Company; J. H. Karrh, Westvaco Chlorine Products Corp.; Elvin H. Killheffer, E. I. du Pont de Nemours & Co.; Chas. L. Lightfoot, Anchor Hocking Glass Corp.; Robert B. Magnus, Magnus, Mabee & Reynard, Inc.; Guy L. Marsters, Norwich Pharmacal Company; E. D. McDaniel, Vitamins Plus; Harold D. Pomeroy, G. S. Stoddard & Company; Robert J. Quinn, Mathieson Alkali Works; J. P. Remensnyder, Heyden Chemical Corp.; Ira Vandewater, R. W. Greeff & Company; Lloyd I. Volckening, The Ivers-Lee Company; E. T. T. Williams, Becton, Dickinson & Co., and Victor E. Williams, Monsanto Chemical Company.

• SURVEY ON WATERPROOFING

Recent developments in production of waterproof and water-repellent fabrics for military and civilan use are described in a survey just issued as Supplement No. 2 to *Textile Research*, official publication of Textile Research Institute, Inc., and the Textile Foundation. The report states that the present emergency has made it necessary for many mills to apply proofing treatments to textiles and that shortage of certain chemicals frequently used for the purpose has made the problem more difficult. It then lists the available materials suitable for rendering fabrics waterproof and water-repellent, outlines various methods of application, and discusses the principal tests to which proofed fabrics are subjected. An important part of the report is a bibliography containing over 100 references to important literature on the subject.

Research workers and technicians whose work is associated with the treatment of textiles to render them waterproof or water-repellent can secure copies of the survey by writing to Textile Research Institute, Inc., 10 East 40th Street, New York.

• MADE DIRECTOR OF APPLICATION RESEARCH

David E. York, formerly of the Sandoz Chemical Co., has recently joined the staff of the Warwick Chemical Co., in West Warwick, R. I., as Director of Application Research. Mr. York is a graduate of the New Bedford Textile School. He was associated with the U. S. Finishing Co. in their Providence, R .I., and Norwich, Conn. plants for several years.

David E. York

He was employed by the Sandoz Chemical Co. for the past two years in the capacity of technical demonstrator in the Charlotte, N. C. area.

Mr. York's varied activities in the textile finishing industry have made him well known in that field throughout New England and the Southern States.

• MOVES TO CHICAGO HEADQUARTERS

George B. Chabot, Jr., of the staff of the Calco Chemical Division, American Cyanamid Company, has been promoted to the position of salesman with headquarters in Chicago.

Mr. Chabot, long a resident of New Jersey, attended Pratt Institute and the New Jersey College of Engineering, from which school he graduated in 1928. After finishing college, Mr. Chabot went to work for Zinsser & Company, where he served as a colorist for one year. From there he went to John Campbell & Company and thence to A. Klipstein Company, where he received the groundwork which brought him into the technical staff of the Calco Chemical Division.

During the last twelve years with Calco he has been active as a colorist and standardization expert with particular activity in the fur dyeing trade. Since the outbreak of hostilities, Mr. Chabot has been identified with technical service on Government contracts.

• WALTON MADE DIRECTOR OF TEXTILE DIVISION

The resignation of Henry Rose from his post as Director of the Textile, Clothing and Leather Division, was announced recently by J. R. Kimberly, Deputy Director General for Industry Division. Mr. Rose's resignation took effect December 15.

Mr. Rose will return to his duties as president of the Henry Rose Stores, Inc., in New York, from which he has been on leave of absence for the past six months. He came to WPB originally as Chief of the Textile, Clothing and Leather Branch and has been Chief of the Branch and later Director of the Division during a period of expansion and realignment in line with the general War Production Board reorganization.

He will continue his services with the Textile, Clothing and Leather Division in a consulting capacity.

Succeeding Mr. Rose as Director of the Division is Frank L. Walton, present Deputy Director.

Mr. Walton has been associated with the War Production Board and its predecessor, the Office of Production Management, since March 1, 1941, and previously served as Chief of the Textile and Fiber Section. He came to the Office of Production Management from the New York firm of Catlin Farish Company, textile mills selling agents, of which he was vice-president.

Mr. Walton's home is in Bronxville, New York.

• MATHIESON PERSONNEL CHANGES

The Mathieson Alkali Works, Inc., 60 East 42nd Street, New York City, announces the retirement of John A. Kienle, Vice President-director of sales, effective November 18th, 1942. Mr. Kienle joined the Mathieson Alkali Works as Manager of Sales in 1920, and was elected Vice President-Director of Sales in 1922.

Esse E. Routh has been elected Vice President-Director of Sales. He was educated at Virginia Polytechnic Institute and Davidson College. Mr. Routh enjoys the unique distinction of having spent his entire business career with the Mathieson Alkali Works, Inc., spending the early years of his business life at the Saltville, Virginia Works, serving as Southern Sales Manager from 1920 to 1928 and General Manager of Sales from 1928 to date.

Robert J. Quinn becomes Assistant to the Vice President-Director of Sales. He received his chemical engineering degree at the University of Illinois in 1912. He joined the Mathieson Alkali Works, Inc., in 1920 as Western District Sales Manager in Chicago, Illinois, and became Asssitant General Manager of Sales in the New York Executive Office in 1923.

D. W. Drummond has been appointed General Manager of Sales. He was born in Philadelphia and graduated from the University of Pennsylvania in 1926. Mr. Drummond joined the Mathieson organization in 1938, became Manager of Solid Carbon Dioxide Sales in 1939 and Assistant General Manager of Sales in 1941.

• "E" TO PROCTER & GAMBLE

The Procter & Gamble Company announced that its subsidiary, The Procter & Gamble Defense Corporation, had been awarded the Army and Navy "E" for meritorious performance in the production of ammunition at the Wolf Creek Ordnance Plant at Milan, Tennessee.

The plant, which has been in production more than a year, is being operated by Procter & Gamble personnel. Finished three months ahead of schedule in October, 1941, it is stated that the project moved up production far in excess of original plans. The key personnel to operate the plant was drawn from the Company's many departments, including engineering, chemical, buying, transportation, and accounting.

The event was celebrated at Milan, Tennessee, on December 3rd, with officials of the Army and Navy, prominent citizens of the community, and Procter & Gamble executives in attendance.

The Procter & Gamble Defense Corporation has completed a similar shell-loading unit for the Government near Aberdeen, Mississippi, which will go into production shortly. This plant also will be managed by Procter & Gamble key personnel.

• GLYCERAID

Fats salvaged from the frying pan make glycerine, and glycerine makes explosives to help blast the Axis on the firing line.

Glycerine is indispensable in war production behind the line because it is the principal ingredient of nitro-glycerine, smokeless powder, bombs, torpedoes, etc. But according to "Domestic Commerce," industry of all kinds buys more of this transparent, bland liquid every year than do the shell factories.

So the housewife is selling her salvaged fats to the neighborhood butcher for four cents a pound. Packing houses are saving much of their formerly wasted trimmings so that high-grade glycerine can be made from fresh tallow. Soap manufacturers are using oils whose higher glycerine yield helps to insure that there will be enough for both military and industrial needs.

As a safeguard for military requirements which must be filled first, glycerine for processing civilian supplies has been restricted. In response to the demand for an alternate product, Stein, Hall & Co., Inc., New York, has developed Glyceraid as resembling glycerine in its hygroscopic characteristics.

It is claimed that the advantage of Glyceraid is that it absorbs moisture and retains a sufficient amount of it to provide the desired plasticity. Indicated uses for Glyceraid are said to include textile vat printing, paper coating, paper products such as tape, and other industrial purposes. It is not intended for use in food products.

• PURCHASE OF LABORATORY EQUIPMENT

Additional control over the purchase of laboratory equipment was put into effect by the issuance recently of Limitation Order L-144, as amended.

The amended order provides that no purchaser of laboratory equipment shall be permitted to acquire an item valued at more than $50 or any quantity of the same item to the value of more than $50, without securing an authorization for such purchase from the Director General for Operations.

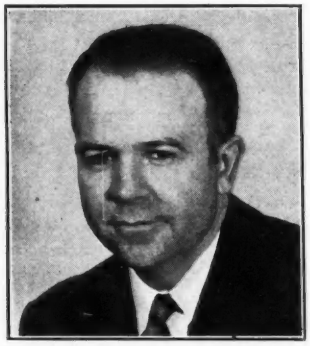
Application should be made on Form PD-620. Purchases authorized on the basis of this form will be assigned an AA-4 rating.

"Laboratory equipment" is defined in the order to mean material, instruments, appliances, devices, parts thereof, tools and operating supplies for laboratories, or for use in connection with operations usually carried on in laboratories, not including second-hand items.

• TO SUPERVISE CHEMICALS FOR SYNTHETIC RUBBER

Dr. Roy A. Shive, of the Calco Chemical Division of American Cyanamid Company, has been called to Washington by the Rubber Reserve Company to supervise production and development of chemicals for synthetic rubber. It was announced by the Calco Chemical Division of American Cyanamid Company that Dr. Shive left for Washington immediately to assume his new duties in the program being carried out under National Rubber Administrator Robert M. Jeffers.

Recipient of the "Modern Pioneer" award of the National Association of Manufacturers in 1940, Dr. Shive has carried out research in the field of the fermentation industries and on the utilization of rubber latex in the rubber field. This was followed by extensive research and development on synthetic resin coatings and pigments. At Calco he has supervised research and development of organic dyes and intermediates for use in the organic pigment industry and allied fields.



Roy A. Shive

Dr. Shive is a native of Pennsylvania and was graduated from Pennsylvania State College in 1921 with a B.S. Degree in Chemistry. He received his Ph.D. at the University of Illinois in 1924, and in the same year joined the Liberty Yeast Corporation at Pekin, Illinois, to carry out research on manufacture and utilization of compressed yeast. When the company was absorbed by the Fleischman Yeast Company, Dr. Shive entered the Central Research Laboratories of the U. S. Rubber Company in New York. It was there that he began his inquiries into the utilization of latex. Before going to Calco in March, 1934, Dr. Shive was engaged in developing pigments and synthetic resin paints and enamels for Du Pont, and as director of manufacture for the Arco Company of Cleveland, Ohio.

Dr. Shive is a member of the American Chemical Society, the American Society for Testing Materials, the American Institute of Chemists, and the Chemists' Club of New York City.

• JOINS WARWICK

The newest member to join the staff of the Warwick Chemical Company at West Warwick, R. I., is Leonard Shapiro. Mr. Shapiro received his Master's Degree at the Massachusetts Institute of Technology in 1936 and shortly afterwards became associated with the Interlaken Mills at Fiskville, R. I. It was in his capacity as plant chemist at Interlaken that Mr. Shapiro became well known in the Rhode Island textile finishing industry.

His new duties at Warwick entail research and the development of new products for the textile industry.

• TEXTILE RESEARCH FOR WAR

The organization of Textile Research for War, was the theme of an address by Fessenden S. Blanchard, President of Textile Research Institute, before the Textile Division of the American Society of Mechanical Engineers, December 2. This meeting was part of the general program of annual meeting of A.S.M.E. held in New York at the Hotel Astor.

Mr. Blanchard mentioned the prompt action, after Pearl Harbor, on the part of the Government to conserve raw materials, and the immediate effect upon the textile industry. The finding of substitutes and the development of textiles to meet the varied requirements of world warfare presented thousands of new problems, all urgently calling for answers. Meeting these demands has taxed the research facilities of both Government and industry.

Mr. Blanchard mentioned the more important research organization and foundations within the industry, as well as those within the Government, and in the various branches of the Armed Services. He described the relationship and work of the Textile Foundation and Textile Research Institute and the formation under the auspices of the latter organization, of the Textile Research War Council. Some of the specific work being engaged in by the Institute include work in connection with the conservation of wool; the development of high strength cotton yarns for lighter weight military equipment and substitutes for manila and sisal for rope and cordage; development of clothing for high altitude flying; study of the resistance of fabrics to ultra violet light, and participation in the work of various committees formed under the Office of Quartermaster General.

"We in the textile industry," said Mr. Blanchard, "undoubtedly will face the severe competition of other industries after the war, including that of the paper industry, to a degree greater than many of us may now realize. If we are to hold and develop our position in American industry, it is up to us to unite in the support of textile research, as the paper industry has backed up its splendid Institute of Paper Chemistry, and as the Gas industry is backing its recently organized Institute of Gas Technology."

Action of Strong Acid on Various Fibers

H. C. Haller

Chemist, Continental Mills, Inc.

A FEW fibers placed under a covered glass were allowed to be reacted upon by 70 per cent H_2SO_4. The initial reaction was observed; some cases showed this to be immediate, while others were slower.

Measurements were made by using the ocular micrometer just as the acid contacted the fiber. This measurement was computed against the same fiber and its diameter 10 minutes later. Only one fiber was measured on each slide. The original fiber was taken as having a unity diameter and the final swelling ratio is unity times the times swollen.

A few outstanding reactions with 50 per cent HNO_3 are also given. All the other fibers showed slight swelling with accompanied yellowing.

Fiber	70% H_2SO_4 *First Reaction*	*10 Min.*	*Swelling Ratio*	50% HNO_3 *Reaction*
Fine Domestic Wool	Distorted Swelling. Starts at edges	Uniformly swollen. Slightly yellow	.75	Slow yellowing
Carbonized Wool	As above	As above	1.66	Rapid yellowing
Wool Kemp	Swells more slowly than healthy fiber	As above	1.22	
Mohair	Distorted swelling, starts at edges	As above	1.40	
Cashmere	As above	As above	2.00	
Alpaca	As above	As above	1.33	
Acetylated Wool	As above	As above	1.33	
Camel Hair	As above—Scales bend out from fiber No great distortion	As above	1.33	
Muskrat (Bleached)	Distorted swelling	Scale appearance intensified	1.50	
Rabbit	Swells slowly at edges	Reaches uniformly swollen state	1.20	
Seal Hair	Action very slow—No great distortion	Swells only slightly	1.01	
Cow Hair	Distorted swelling	Similar to wool	1.20	
Cat	Swelling starts rapidly	Attains uniform swollen state	1.10	
Tussah Silk	Rapid convulsing and swelling	Nearly all dissolved	—	
Cultivated Silk	Dissolves rapidly			
Cotton	Dissolves rapidly			
Rayon	Dissolves rapidly			
Acetate	Dissolves rapidly			
Linen	Dissolves rapidly			
Kapok	Convulses rapidly, forms bubbles in fiber	Dissolves slowly	—	Produces bubbles and spotty yellowing
Ramie	Disintegrates into long slivers	Leaves pigment trail effect		No change
Aralac	Rapid distorted swelling forming diamond pattern across fiber	Attains uniform size, loses diamond stress pattern. Turns violet	—	
Soybean	Rapid distorted swelling with diamond stress patterns	Attains uniform size, loses diamond pattern. Turns lt. yellow		
Vinyon	No visible change			
Seran	No visible change			
Nylon	Dissolves very slowly			Immediately changes to viscous form collecting in small pools

Book Reviews—

(Continued from page 672)

This book is undoubtedly the most complete work that has ever been published regarding mercerization and is highly recommended to everyone who might be interested in the subject.

Industrial Research *by F. Russell Bichowsky. Published by Chemical Publishing Co., Brooklyn, N. Y.* 1942. 126 *pages. Price* $3.25.

This book should prove of great interest not only to those who are engaged in research work, but who may be associated with the promotion of research for any particular industry. It may be looked upon as a textbook for the director of research as well as the business executive. The author in his Preface states:

"There are no new lands for America to exploit. It is probable that there are but few new mines and oil deposits yet to discover. There is left but one possible source of new wealth to replace the wealth lost in war. This source of wealth is the discovery of new products to manufacture and sell. It is on this source of wealth that we must now and in the future depend for the means to maintain and raise our standard of living.

"It is from the research laboratory that this new wealth must arise, as has originated in the past, the new wealth represented by the automobile industry, the radio industry and the industries founded on the movies, the electric lamp, the aeroplane, plastics, rayon, nylon, Kodak and hundreds of other new products. This wealth has never been fairly estimated but it probably represents well over two hundred billion dollars."

The following titles of chapters will give the reader an idea of the scope of the volume.

I. Research the Destroyer of Business.
II. Research the Creator of Wealth.
III. What is Research?
IV. The Prenatal Factors of Invention.
V. The Postnatal Factors of Invention.
VI. Research for the Small Company.
VII. Place of Research in Company Organization.
VIII. The Equipment of the Laboratory.
IX. Technical Control of the Laboratory.

Felting Properties of Wool—

(Concluded from page 670)

Another set of experiments was made using 7 per cent KOH in 95 per cent ethanol at 25°C. Here it is evident that the repeated short treatments are more effective than a single long treatment. K_s is reduced to zero in four such short treatments. These results agree very well with the theory that alkaline solutions acting only on the surface of wool fibers lower K_s, while alkaline solutions reacting on the interior of fibers as well as on the surface increase K_s. The results are shown in Table 6.

TABLE 5

5 sec. soaking in 1 per cent sodium hydroxide at 25°C. and 2 minutes soaking in 5 per cent sulfuric acid at 25°C., for each treatment. Samples were all rinsed in cold water and air dried.

before felting	K_s
2 treatments	0.0075
6 treatments	0.0076
12 treatments	0.0049
Untreated	0.0063
1 min. 1% NaOH	0.0063

TABLE 6

1 min. 7 per cent potassium hydroxide at 25°C. in 95 per cent ethyl alcohol. 2 min. 5 per cent sulfuric acid (by volume) at 25°C. in 95 per cent ethyl alcohol. Rinse in cold running water and dry 10 min. in circulating air at 58°C. Entire procedure repeated for each treatment.

Treatments	K_s
1	0.0012
2	0.0013
4	0.0000
6	0.0001
Untreated	0.0063

Samples soaked once in 7 per cent alcoholic potassium hydroxide at 25°C. then treated as above.

Time of Soaking	K_s
1 min.	0.0012
2 min.	0.0012
4 min.	0.0012
6 min.	0.0043

SUMMARY

1. The rate of shrinkage of wool can be increased by treatment with aqueous solutions of alkalies. Stronger alkalis, longer treatments, and increased temperature of treatment all favor an increased rate of shrinkage.

2. The rate of shrinkage of wool can be decreased by treatment with aqueous solutions of alkalies. Here, using 1 per cent solutions of NaOH, it was necessary to use low temperatures and short time of contact to decrease the rate of shrinkage of the treated wool. Saturating the NaOH solutions with salt helped in lowering the rate of shrinkage of the treated wool.

3. Alcoholic solutions of KOH or of NaOH in general lowered K_s of the treated wool. It was shown that repeated short treatments of wool with alcoholic KOH, each treatment followed by neutralization, could reduce the rate of shrinkage of wool to zero.

4. Ammonia or its derivatives tended to increase the rate of shrinkage. Trimethylbenzylammonium hydroxide in ethyl alcohol decreased the rate of shrinkage of treated wool slightly.

5. In general the results indicate that alkalies reacting on wool so as to affect principally the surface reduce the rate of shrinkage of the treated wool, while alkalies acting so as to affect the interior as well as the surface of the fibers increase the rate of shrinkage of the treated wool.

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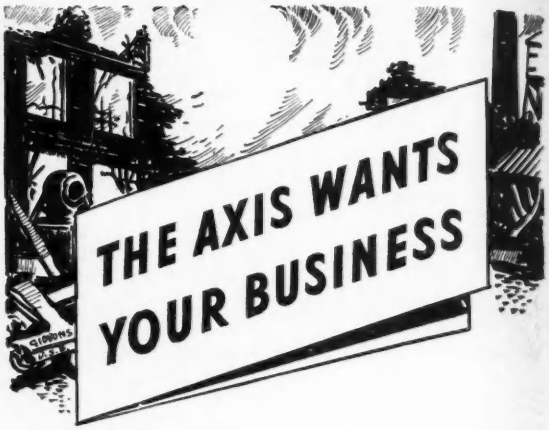

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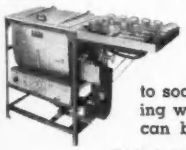

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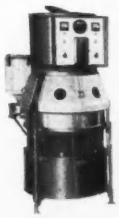

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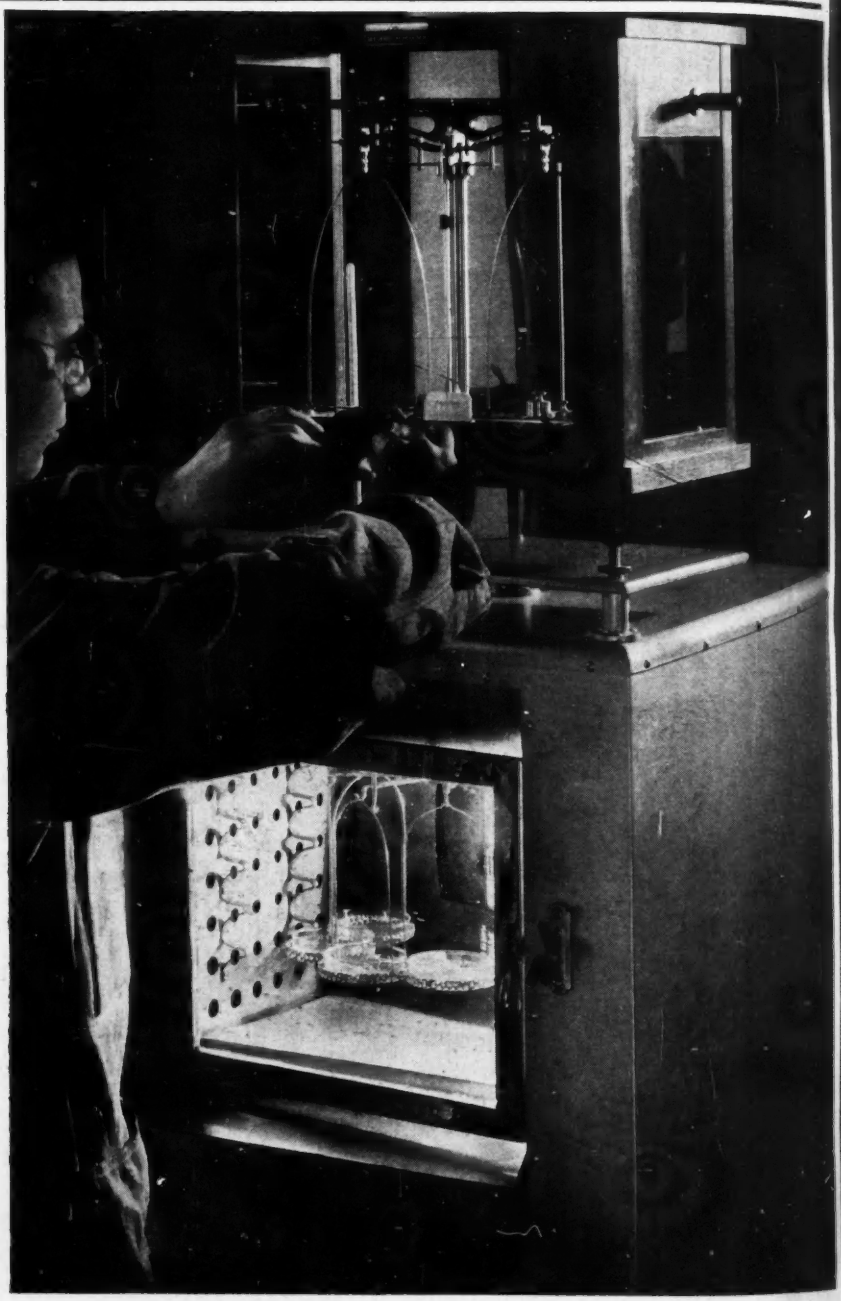

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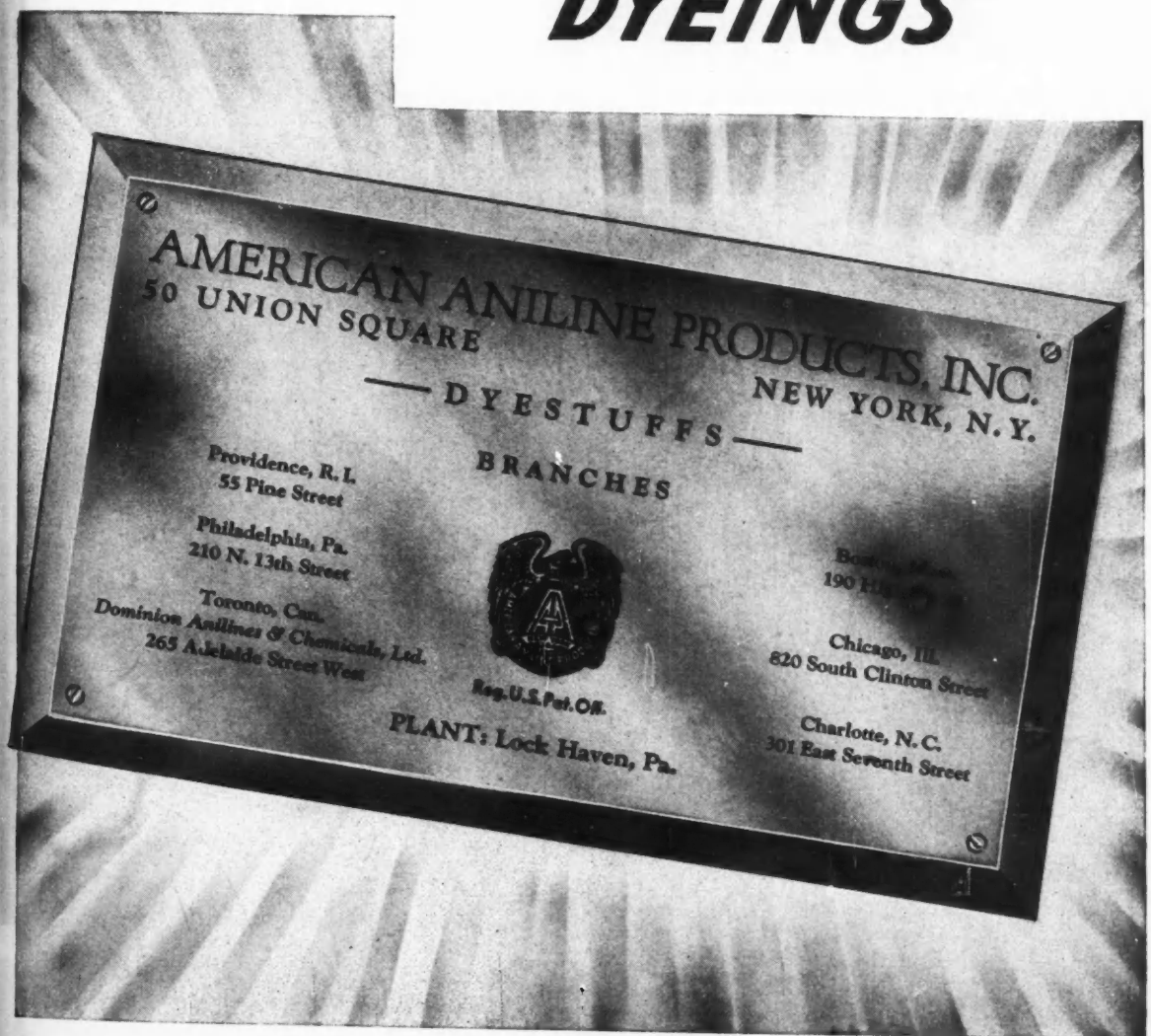

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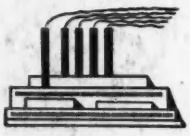

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